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ORIGINAL ADDRESSES.

ANÆSTHESIA.

An Address delivered before the International Medical Congress, Berlin, August 6, 1890.

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THE most brilliant modern achievements, in the direct saving of life, of the science and art of medicine are connected with surgery. These great achievements have been rendered possible by two epoch-making discoveries, antisepsis and anæsthesia. The long array of fatal cases of poisoning by carbolic acid, by iodoform, by corrosive sublimate, and by other antiseptic agents; the hundreds of deaths from chloroform, ether, and other anæsthetics, all bear witness to the verity of that strange law, in obedience to which the progress of the human race is so often at the sacrifice of the individual. Antisepsis has outgrown the dangers of its youth, and to-day the measures that are meant to save, very rarely kill. On the other hand, the death-roll of anæsthesia is daily added to; added to, according to my belief, at a rate that has not changed in forty years. Though this be true, from far-off Australia comes the news that jury and judge have condemned to heavy penalty a chloroformist who had lost his patient; and in Old England itself, the leading medical journal lends support to such a verdict by affirming that "deaths from chloroform are preventable, that with due care they may be avoided," and that, therefore, when they occur, they are the result of ignorance or carelessness. Five hundred deaths and more—the result of ignorance or carelessness! Five hundred surgeons, including such names as Billroth, Jaeger, Simpson, McLeod, Agnew, Hunter McGuire, and others of equal rank, guilty of manslaughter! And still the carnage goes on. Surely under such circumstances the subject of anæsthesia is worthy of the attention of even this, the most learned medical gathering of the nations that the world can furnish. Antisepsis, the gift of the Old World to humanity: anæsthesia, the gift of the New World, which made the fruits of antisepsis possible: surely it is fitting that I, standing here to-day before you all, as the representative of the newer civilization, should be the chosen mouthpiece for the renewed discussion of this old but pressing theme.

In attempting a fresh study of a well-threshed-out subject, I propose to take advantage of the modern physiological methods, and to endeavor to discover by experiments upon the lower animals how anæsthetics kill, and what drugs or measures are most powerful in putting aside their lethal effects. This brings us face to face with the question—How far is it possible to adapt experiments to the needs of practical medicine, and to reason from the dog to the man? A full discussion of this subject would not be opportune, but it does seem necessary for our purpose to devote a few minutes to the pointing out of certain general guiding principles.

It ought to be acknowledged as a fundamental axiom, that no amount of experiments can overthrow a clinical fact; although when a contradiction between experimental and bedside observation seems to arise, such contradiction challenges the correctness of the alleged clinical and experimental facts alike, and should lead to a careful reëxamination. No amount of failure to purge a dog by elaterium proves that elaterium does not purge man; whilst, on the other hand, the discovery that digitalis increased the blood-pressure in the lower animal very properly led to doubt as to the correctness of the, at the time, general belief that digitalis acts upon man as a cardiac sedative, and finally to the recognition of the falsity of the clinical observation upon which such belief rested.

Whatever difficulties may beset the path of the experimental therapeutist, it is certain that law is throughout the universe supreme: that man, at least in his physical nature, is only an especially developed animal: and if drugs act differently upon different animals, such action must be in obedience to certain laws, to us known or unknown.

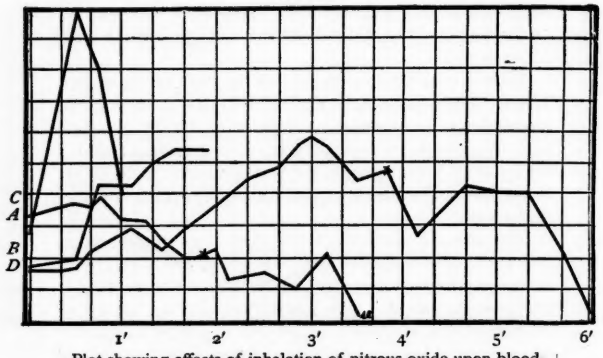
Any attempt to discuss fairly these laws would lead us too far afield for the present. One law, however, treads so closely upon the matter at hand this morning, that it requires statement. This law is, that when an apparatus or system is of similar function and of similar functional activity in different animals, the difference in the action of remedies is very rarely, if ever, in kind, though it may be in degree. Throughout mammalia the heart has one general structure, and one general function; the heart of the dog responds to the touch of digitalis precisely as does the heart of the man. The human brain is so much more highly developed than the brain of the lower mammal, that it is, in fact, a new organ or apparatus, and its relation to drugs changes with the change of structure and of function. The scope of this law in regard to anæsthesia is not far to seek. The functions especially compromitted in lethal anæsthesia are respiration and circulation. Surely these functions are similar throughout mammalia, and surely we ought to be able to reason safely concerning them, from the dog to the man.

Recently, however, alleged clinical facts have been challenged by high authority, upon the strength of experimental results. Under these circumstances, nothing must be at once abandoned, everything must be reexamined. These reëxaminations I have made, and I may be pardoned, perhaps, if I affirm that a complete study of the clinical and experimental evidence brings out, not a discord, but a most beautiful concord—that concord between experimental and practical medicine which so often fails to appear simply because we cannot fit together the fragments of truth in our possession.

Although numerous substances have been tried, there are to-day in use, practically, only three anæsthetics—nitrous oxide, ether, and chloroform. Of these, nitrous oxide stands apart, because it produces loss of consciousness not by virtue of any inherent properties, but simply by shutting off from the nerve-centres the supply of oxygen.

It has been asserted that the changes of circulation produced by the inhalation of nitrous oxide are essentially different from those of mechanical asphyxia, and that therefore nitrous oxide does not act as an asphyxiant. It must, however, be borne in mind that the phenomena of mechanical asphyxia are largely due to the presence of an excess of carbonic acid in the blood, whilst in the asphyxia produced by nitrous oxide there is no excess of carbonic acid, so that the phenomena present are simply the outcome of a lack of oxygen. It is, therefore, *a priori*, to be expected that the phenomena of mechanical and of nitrous oxide asphyxia should differ to a certain extent. To determine the way in

FIG. 1.



Plot showing effects of inhalation of nitrous oxide upon blood-pressure. *A*, first inhalation. *B*, second inhalation. *C* and *D*, inhalations in different dogs.

which nitrous oxide inhalation affects the circulation, I have, during the past winter, in connection with my assistant and friend, Dr. David Cerna, made a long series of experiments. The result has been to show that usually the inhalation is followed by a rise of the arterial pressure, accompanied by a great disturbance of the pulse; the pulse at first becoming irregular and tumultuous, but by and by settling, so that when anæsthesia is complete the pulse-wave is remarkably large and full, and the rate very slow. The rise and fall of the arterial pressure in nitrous oxide anæsthesia was found to vary remarkably, not only in different inhalations, but in different periods of the same inhalation. Sometimes the rise was sudden, sometimes it was slow and gradual: sometimes it was maintained until near death, sometimes it was interrupted very early: sometimes it was not very well marked, sometimes it was enormous. As illustrating it, I have the accompanying diagrams, accurately showing the curve of the blood-pressure obtained in four inhalations practised on three different dogs. (Fig. 1.)

In all our experiments respiration ceased while the heart was still in full activity. Indeed, instead of the gas acting as a cardiac depressant, it appeared to act as a cardiac stimulant, although it paralyzed the vaso-motor apparatus. Thus, during complete anæsthesia, faradic irritation of the sciatic nerve always failed to register itself in an increase of the blood-pressure, although the heart was beating very powerfully, and although the pneumogastrics had been previously severed: whilst late in the poisoning—at a time when the respiration had absolutely ceased, and the animal was in this respect dead, and without the power of self-recovery, and when the arterial pressure also had fallen almost to zero—the pulse-waves were frequently still nearly three times the norm. In evidence of this I append a reproduction of a tracing (Fig. 2).

We made but few experiments as to the action of artificial respiration upon the animal dying from nitrous oxide, but these experiments proved that even after complete paralysis of the respiratory function, artificial respiration is capable of rapidly bringing the animal

FIG. 2.

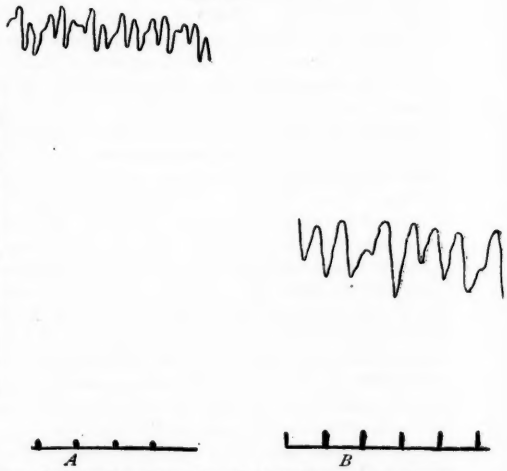


Figure showing the relative size of the pulse waves in nitrous oxide anæsthesia. Tracing *A*, before inhalation. Tracing *B*, after breathing had stopped.

back to life. The heart lives on through nitrous oxide anæsthesia long after the respiratory function has been abolished, and even when the strong, full pulse fails, and the heart has almost ceased to quiver, recovery is still hopeful, because the loss of function has been caused, not by the presence of a poison, but by the absence of oxygen; and although the paralysis may be complete, the life-power sleeps before it dies, and is ready to awake at the touch of fresh oxygen.

These experimental results are in strict accord with clinical observations. The S. S. White Dental Manufacturing Company supply a very large, if not the largest, portion of the apparatus and material used for the administration of nitrous oxide in the United States; and, in answer to my inquiry, Dr. J. W. White, their President, writes me that a computation based upon their own sales, and a knowledge of those of their rivals, has reached "the somewhat appalling result, that anæsthesia by nitrous oxide gas is probably effected in three-quarters of a million of cases annually in the United States." Most of these inhalations have been given, not by trained physicians, but by comparatively untrained, and often

very ignorant dentists; have been given to patients in a sitting or semi-sitting posture: have been given apparently without thought or care to the general community, as the units presented themselves, to the healthy and to the diseased alike; and the result is, out of many millions of inhalations only three deaths recorded as directly due to nitrous oxide! Could anything be safer?

A suggestive and very practical fact which came out in our experiments, is that sometimes during an inhalation of nitrous oxide the rise of the arterial pressure is extraordinary and abrupt. Not long since, in the city of Philadelphia, a gentleman arose from the dentist's chair after an inhalation of nitrous oxide, staggered, and fell in an apoplexy. Is it not easy to perceive that when the arterial system is diseased, the great strain of a sudden rise of blood-pressure may produce rupture?

Some years since, Dr. Kenderdine, a Philadelphia surgeon of local note, died of diabetes, which he insisted was produced in him by the inhalation of nitrous oxide. This is in accord with the researches of the French physician Dr. Lafont, who reported a case in which sugar appeared in the urine twice in a patient, after inhalation of the gas; and who also caused in himself, and in dogs, temporary glycosuria by such inhalations. Further, Dr. Lafont noticed in a case of mitral insufficiency temporary albuminuria.

I am not aware that these very suggestive statements of the French physician have given rise to any research, except five experiments made recently upon healthy men, with negative results, by two medical students of the University of Pennsylvania, Messrs. George S. Woodward and Alfred Hand, Jr. I do not believe that ordinarily the inhalation of nitrous oxide is followed by sufficient disturbance of the circulation to register itself in the urine, but the negative evidence of Messrs. Woodward and Hand is not sufficient to render it improbable that in exceptional cases the inhalation of nitrous oxide may produce albuminuria or glycosuria. Such phenomena, if they occur, are in all probability not directly produced by the nitrous oxide, but are due to the disturbances of capillary circulation caused by it.

However these facts may be, it seems to me that great caution should be used in the administration of nitrous oxide to persons the coating of whose arteries is diseased, and it is probable that when widespread atheroma exists, ether is a safer anæsthetic than nitrous oxide.

When respiration has been suspended in nitrous oxide anæsthesia the overwhelming indication is certainly for the employment of artificial respiration.

Notwithstanding the great safety and the many advantages which attend the anæsthetic employment of nitrous oxide, the gas can never be used for the general purposes of the surgeon, on account of the excessive fugaciousness of its influence.

The perfect anæsthetic will be a substance which has the power of paralyzing the sensory nerve-trunks without affecting other functions of the body. If such drug exists, it yet awaits the coming of its discoverer. Probably until such a sensory nerve paralyzant is found, chloroform and ether will maintain the complete supremacy which they now have; and in the further discussion of my subject I shall confine my remarks to them. Lack of time limits this discussion to:

First. The method in which these two drugs kill, both in man and in the lower animal; that is, whether they destroy life through the circulation or the respiration.

Second. The comparative fatality attending the use of these two agents, and the reasons for the difference.

Third. The comparative disadvantages between the two agents, and the best method of securing the desired results.

Fourth. The treatment of accidents occurring during ether or chloroform anæsthesia.

In regard to the method in which anæsthetics kill, my own teaching hitherto has been: first, that although ether in moderate doses acts as a stimulant to the circulation, yet in overwhelming amount it is capable of depressing the heart, but that such depression of the heart is always less than the depression of the respiration, and therefore, ether kills always through the respiration; second, that chloroform may produce death by paralysis of the respiratory centre, or by a simultaneous arrest of respiration and circulation, but that primary paralysis of the heart may occur, and is especially prone to do so when the chloroform vapor has been given in concentrated form.

I think that these views are in accord with general professional belief, but it has recently been alleged that they are at variance with experimental evidences, so that a reëxamination is necessary. What then are the clinical facts?

If any credence is to be attached to the statements of competent witnesses, who have recorded human deaths during anæsthesia, it is certain that in some cases, under the influence of chloroform, the pulse and respiration have ceased simultaneously; whilst in other instances the respiration has failed before the pulse; and in still other cases the pulse has ceased its beat before the respiratory movements were arrested.

Usually ether arrests respiration in man before it paralyzes the heart, but the collection of records made by Dr. J. C. Reeves certainly shows that the fatal result may be produced by syncope. Thus Dr. Ernest H. Jacobs, in a report of a fatal case, asserts positively "the pulse ceased, the breathing continued." It would seem that we must admit that ether in the human subject may cause death in the same methods as does chloroform.

Such then are the clinical facts; or in other words, such are the results of observations made upon the human subject. What are the results of observations made upon animals?

The general teaching in regard to chloroform has been recently challenged by Dr. Lauder Brunton, who, as the result of 450 experiments made by himself upon the pariah dogs of India, has reached the conclusion, published in the London *Lancet*, that however concentrated the chloroform may be it never causes death from sudden stoppage of the heart. In the physiological laboratories of the University of Pennsylvania, for some years, several hundred dogs have been annually used, and a very large proportion of these dogs have been, at the end of an experiment, killed by chloroform. The observations of Dr. Reichert, Professor of Physiology in the University, Dr. H. A. Hare, Demonstrator of Therapeutics, and myself, have been concordant in showing that chloroform is a cardiac paralyzant, and often does kill dogs by a direct action upon the heart or its contained ganglia. The statements made con-

cerning the Hyderabad Commission, however, led Dr. Hare and myself to a thorough and careful restudy of the subject. Some of our experiments were made by injecting chloroform into the jugular vein; others by administering it by inhalation in the usual way.

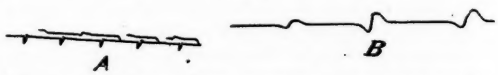
The action of the chloroform seems to be not seriously modified by the method of administration. We definitely proved that in the dog chloroform has a distinct, direct, paralyzing influence on both respiration and circulation; that the respiration may cease before the heart-beat, or the two functions be simultaneously abolished; but that in some cases the heart is arrested before respiration. We have several times seen the respiration continue as long as one, and even two minutes after the blood-pressure has fallen to zero, and the pulse has completely disappeared from the carotid artery.[1]

The correctness of our experiments, we claim, must be acknowledged. The experiments have not only been witnessed by a number of persons, but I have with me to-day tracings which I will gladly show anyone especially interested in the subject. I do not desire to express any doubt whatever as to the correctness of the experimental data of Dr. Brunton; I simply claim that both sets of experiments, although they have yielded different results, have been correctly and properly performed. It may be that the high heat or other climatic conditions surrounding the pariah dog make his heart less sensitive to the action of chloroform than is the heart of the dog bred in Northern climates. That the thought of the different constitutions of animals in different climates is not absurd, is shown by the fact that some years ago, after I had affirmed before the Physiological Section of the International Medical Congress at London, that if certain asserted results were obtained upon European dogs, said dogs must differ from those of America, and had been met with a smile of incredulity, Dr. Brown-Séquard rose and stated that he had experimented upon hundreds of dogs on both continents, and that there was a distinct difference between the animals, the vascular system of the European dogs being much more developed, and operations upon them being, therefore, much more bloody than was the case with the American dog.

A very curious parallel might be traced at this point between the experimental and clinical evidence in regard to the effect of climate upon the action of chloroform. In the Southern United States chloroform is used with great freedom, and with great alleged safety; and as long ago as 1878, Dr. Landon B. Edwards, editor of the *Virginia Medical Monthly*, wrote: "It is one of the most peculiar facts I have ever known in medical practice—the difference of experience in Europe and the North, with chloroform and ether, as compared with that of the South—the high rate of mortality in the North, and the low rate in the South.

In a series of experiments which I have recently made to determine the changes in the circulation produced when ether anæsthesia is carried on to death, I have found that in the first periods of anæsthesia the blood-pressure is usually elevated, and that it is usually quite high at a time when the respirations are very shallow and imperfect, and the dark color of the blood shows that it is heavily charged with carbonic acid. It is not, however, very rare for the blood-pressure to remain near the norm, and I have seen the blood-pressure begin to fall in the very first stages of ether anæsthesia; moreover, in at least two experiments death occurred from syncope, the respiration continuing for one or two minutes after the complete cessation of the circulation. In an experiment in which the fall of blood-pressure was most pronounced, and the arrest of the heart most complete, the dog was sick from the mange, and it is possible that the weakened heart was more susceptible than is the normal heart to the depressing influence of ether.

FIG. 3.



Tracing showing respiratory movements, *B*, registered one and a quarter minutes after circulation had fallen as shown in *A* during death from ether in the dog.

So far, then, as concerns the method in which ether and chloroform kill, I claim most urgently that there is no contradiction between the results as obtained by the bedside and in the physiological laboratories, and that a complete, broad study of the clinical and experimental evidence leads to one conclusion, namely, that chloroform and ether are capable of paralyzing the respiration and the circulation; that in some cases one function, in other cases the other function, is primarily arrested; but that ether is less prone to produce a primary arrest of the heart than is chloroform.

In the discussion of the second point which I have raised, namely, the comparative fatality attending the use of ether and chloroform, I shall not occupy time with any elaborate setting-forth of the clinical evidence. In regard to the number of recorded deaths, I shall content myself with accepting the latest statistics at hand, namely, those collected by Dr. Laurence Turnbull, who has found 375 deaths reported from chloroform, and 52 from ether. I do not believe that these figures nearly represent the total mortality; I doubt very much whether one-third of the deaths from anæsthesia are reported; certainly not one-third of the cases I have had personal knowledge of have been publicly recorded. Moreover, the pressure to conceal deaths from chloroform is greater than when the lethal result is due to ether. The surgeon who uses ether feels that he has employed the safest anæsthetic, and that he will receive no blame if a death occurs from it, and feels also that he has a rare case to put on record, which will give his own name a permanent place in anæsthetic literature; whereas the surgeon who uses chloroform knows that if death occurs from the anæsthetic, a very large proportion of the profession, at least in the United States, will condemn him either in public or secret for the use of this drug, and that he will be fortunate if he escape being publicly condemned by a coroner's jury. Moreover, deaths from chloroform are only too common, so that the surgeon has nothing to gain and much to lose by publication of a chloroform death, and if possessed of the average human nature, holds his peace. The Coroner's Physician of Philadelphia, Dr. Formad, informs me that he has made autopsies in 15 cases of

[1] No tracings showing these facts are here given because they have been previously published in THE MEDICAL NEWS (February 22, 1890).

ether death, only 3 of which have been reported in medical journals: how many chloroform deaths have been lost in eternal quiet?

It seems to me impossible to get at the exact number of anæsthetic deaths, or the proportionate fatality of ether and chloroform. Lyman considers that in regard to chloroform, the ratio of deaths to inhalations is 1 in 5860; Richardson, that it is 1 in 2500 to 3000. Andrews puts it for ether, at 1 in 23,204; and Lyman, at 1 in 16,542.

Without claiming strict accuracy for any of these figures, I think it can be asserted that the ratio of deaths from chloroform is probably at least four or five times that of deaths from ether.

When we come to study the effects of chloroform upon the lower animals, we find that it varies very distinctly in its action on the different species. The cat seems to withstand the fatal influences of chloroform with a power worthy of its reputed "nine lives." Many years ago, Professor Schiff called attention to the fact that the use of chloroform as an anæsthetic in the dog is usually attended with the loss of many animals. Professor Martin, of the Johns Hopkins University, writes me that the margin between complete chloroform anæsthesia in the dog, and chloroform death, is a very narrow one. This certainly is our experience in the University of Pennsylvania; we have never been able to use chloroform as an anæsthetic without losing a very large proportion of our dogs.

Clinical and experimental results—*i. e.*, the results of experiments made in the physiological laboratory upon the lower animal, and the results of experiments made in the amphitheatre upon the higher animal, Man—are again concordant. Chloroform is much more inimical than ether to animal life. The cause of this singular fatality is not, however, chiefly the cardiac action of chloroform. Chloroform is more apt to cause cardiac arrest than is ether, but it is also much more prone than is ether to cause death by failure of the respiration. Almost invariably, when ether is withdrawn before the dog is absolutely in the grasp of death, recovery occurs; but over and over again I have noticed that although the chloroform was taken away whilst the respirations were still being maintained with regularity, the arterial pressure much above zero, and the pulse very apparent, yet the symptoms of cardiac and respiratory failure continued to increase until the fatal issue was reached.

It seems to me that certain general facts or principles in regard to anæsthesia must be considered as established:

First, that the use of any anæsthetic is attended with an appreciable risk, and that no care will prevent an occasional loss of life.

Second, that chloroform acts much more promptly and much more powerfully than ether, both upon the respiratory centres and the heart.

Third, that the action of chloroform is much more persistent and permanent than is that of ether.

Fourth, that chloroform is capable of causing death either by primarily arresting the respiration, or by primarily stopping the heart, but that commonly both respiratory and cardiac functions are abolished at or about the same time.

Fifth, that ether usually acts very much more powerfully upon the respiration than upon the circulation, but that occasionally, and especially when the heart is feeble, ether is capable of acting as a cardiac paralyzant, and may produce death by cardiac arrest at a time when the respirations are fully maintained.

Chloroform kills, as near as can be made out, proportionately four or five times as frequently as does ether; partly, no doubt, because it is more powerful in depressing the heart, but largely because it lets go its hold much less rapidly than does ether when inhalation ceases. Is it not possible that this "holding on" is because it is less volatile than ether, and can we not here get a hint why chloroform is less deadly in the South than in the North? The diffusibility of vapors or gases is in inverse proportion to the square of their densities, and the vapor of chloroform would certainly diffuse itself with far greater rapidity at 90° F. than at 70° F.

The comparative advantages and disadvantages of the two anæsthetics in practical medicine, are so well known, that only one or two points seem to force themselves upon our present attention. I cannot see that the surgeon is justified in putting the life of the patient to the unnecessary risks of chloroformization, except under special circumstances. I believe, moreover, that much of the unpopularity of ether is due to its improper administration. It is so easy to embarrass the respiration seriously by the folded towel, as commonly used, that not only are the struggles of mechanical asphyxia almost invariably produced, but probably death itself is sometimes caused. Especially is there danger of death being thus caused mechanically in the advanced stages of etherization, when the patient is too thoroughly etherized to struggle, and when the attention of the etherizer is, it may be, attracted by some novel and difficult operation. I myself confess to having once nearly killed a patient in this way.

A proper apparatus is certainly preferable to the folded towel. Various apparatus have been invented, but as the time is short I shall only mention one—one which seems to me a practically perfect mechanism, although it is probably little known this side of the Atlantic.

The inhaler invented by Dr. O. H. Allis is based upon the theory that the patient to be etherized should be supplied with a full abundance of air, saturated with the vapor of ether. It consists essentially of a series of foldings of muslin on a wire framework, arranged almost like the gills of a fish, so as to allow the air to pass freely through, but everywhere to come in contact with ether. It should be placed upon the face of the patient dry, and the ether gradually poured on from a bottle with an especially prepared cork, known in Philadelphia as the "polyclinic" bottle. When properly used the Allis inhaler practically does away with the sense of suffocation, and the consequent struggles which have made etherization alike so repulsive to patient and surgeon.

In order to determine the rapidity with which etherization can be produced by this inhaler, Dr. M. H. Williams kept for me notes of thirteen consecutive cases in the clinic of the Jefferson Medical College Hospital in Philadelphia. The average time required for the production of complete unconsciousness was eight minutes. The average time during which anæsthesia was fully maintained was thirty-two minutes; and the average amount of ether used during this time was 7½ ounces. In 21 surgical cases occurring this spring in the clinical

service of Professor J. William White, of the University of Pennsylvania, the average time for the production of complete anæsthesia with ether, used through Allis's inhaler, was seven and nine-tenths minutes. The results arrived at in these two clinics are so close that eight minutes must be considered the average time required for full etherization by this apparatus.

In discussing the treatment of the accidents of anæsthesia, the results obtained at the bedside naturally press forward for careful consideration, but in going over the subject from this point of view, I have found so little that was novel, and so little that was satisfactory to myself, that I shall not occupy the time of this Congress with any conclusions drawn from reported cases, or personal experience in chloroform accidents. I do not think myself that the problem can be solved by any such study of cases. Death is so near and so terrible, time is so absolute, moments so important, that no surgeon would be willing or justified in waiting for the effect of any one remedy; and when a man is dosed with alcohol, nitrite of amyl, hypodermic injections of ether, digitalis, atropine, and other powerful agents; faradized, slapped, douched, stood on his head, subjected to chest movements for artificial respiration, and to various other measures too numerous to mention; who can tell, if by chance he recover, why he has done so? or who can point out, if by chance he die, what is the remedy whose omission or commission has led to the fatal result?

The problem is a very complex one, not to be worked out amidst the excitement and responsibilities of the amphitheatre. Only in the physiological laboratory can its various elements be separated and studied each by itself, without regard to the individual life which is at stake.

In the physiological laboratory two distinct paths open, each promising to lead to some positive knowledge. We may, on one hand, enter upon the study of the minimum fatal dose of the anæsthetic, and of the results by the concurrent or subsequent administration of its supposed physiological antagonist; or we may investigate the effect of remedies upon functions that are failing under the influences of the anæsthetic.

The objections to the first of these methods have been, in the present instance, overwhelming. The accidents seem to be independent of the amount of anæsthetic inhaled; and such a method of investigation would have required far more time than was available after I had had the honor of being asked to address this body. Death is produced by chloroform and ether through paralysis of the respiration and the heart, and the method of experimental study which I have employed consisted in a study of the action of powerful agents upon these functions when oppressed by chloroform. I have selected chloroform chiefly because it is the more powerful agent of the two anæsthetics, and the more certain in its lethal results.

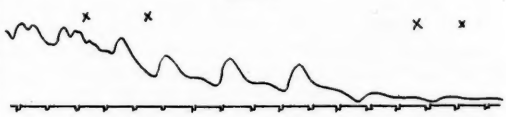
The experiments have all been made upon dogs, by one plan. The carotid artery and also the trachea, having been connected with a recording drum, so that the movements of the circulation and the respiration could be consecutively recorded, the animal was anæsthetized, and when the blood-pressure had fallen almost to zero, and the respiration had ceased, or nearly ceased, as the case might be, the remedy to be tried was injected into the jugular vein, through a canula which had been previously inserted.

The more important remedies which have been used by clinicians for the averting of threatened death during anæsthesia are ether, alcohol, ammonia, nitrite of amyl, digitalis, atropine, and caffeine, alterations of position, and artificial respiration.

Although, at least in America, hypodermic injections of ether have been frequently employed even in ether accidents, such use is so absolutely absurd that it does not seem to me to require any experimental evidence of its futility. Ether in the blood acts as ether, whether it finds entrance through the lungs, through the rectum, or through the cellular tissue; and the man who would inject ether hypodermically into a patient who is dying from ether, should, to be logical, also saturate a sponge with the ether and crowd it upon his unfortunate victim.

Instead of simply stating the results obtained in my experiments, I have thought it would be more interesting to show reproductions from some of my tracings. The first drug that I shall report upon is caffeine. I have injected it during the cardiac failure produced by chloroform, in doses varying from 3 to 7½ grains, and have never been able to perceive any distinct alteration in the arterial pressure, and no consistent distinct change of the pulse either in number or force. So far as the experiments go, they certainly indicate that the drug has no influence upon the heart that is being overpowered by chloroform. I may also state here, that it is not possible in any of my tracings to make out any influence exerted by caffeine upon the respiration.

FIG. 4.



Anæsthesia complete. Dog still breathing. ½ gramme of caffeine injected at X X, each.

With atropine, I have made a few experiments, the results being almost as negative as with caffeine. Ten c. c. of a 2-per-cent. solution of atropine injected into the jugular vein of a chloroformed animal, altered the rate of the pulse-beat, but had no apparent effect or influence upon the arterial pressure, or upon the respiration, and in no wise prevented final cardiac arrest.

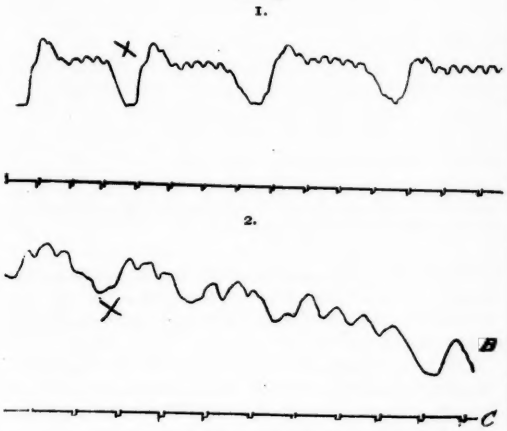
Of all drugs, that which I think is usually most relied upon by clinicians as a cardiac stimulant in anæsthesia, as in other cases of heart-failure, is alcohol. The chemical and physiological relations of alcohol to ether and chloroform are, however, so close, that many years ago I became very doubtful of the value of this drug as a stimulant to a heart depressed by anæsthesia.

These doubts continually grew stronger from what I saw and read as to the effects of the administration of alcohol during anæsthesia, and were finally changed into conviction by the experiments of R. Dubois (*Progrès Médical*, 1883, xi. 951), who found that in the animal to which alcohol has been freely given, much less chloroform is required than in the normal animal, to anæsthetize or to kill; or in other words, that alcohol

intensifies the influence of chloroform and lessens the fatal dose.

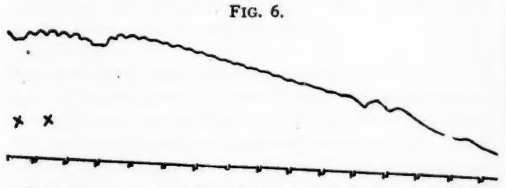
In my own experiments with alcohol an 80-per-cent. fluid was used, diluted with water. The amount injected into the jugular vein varied in the different experiments from 5 to 20 c. c.; and in no case have I been able to detect any increase in the size of the pulse, or in the arterial pressure, produced by alcohol, when the heart was failing during advanced chloroform anæsthesia. On the other hand, on several occasions, the larger amounts of alcohol apparently greatly increased the rapidity of the fall of the arterial pressure, and aided materially in extinguishing the pulse-rate.

FIG. 5.



Tracings showing effects of alcohol injection.
No. 1. four cubic centimetres of 80 per cent. at X.
No. 2. five cubic centimetres of 80 per cent. at X.

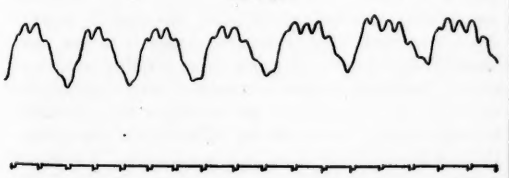
FIG. 6.



Experiment showing effect of injecting twenty cubic centimetres of alcohol in advanced chloroform anæsthesia. Injection made at beginning of tracing between X and X.

The effects of ammonia upon the failing heart of chloroform anæsthesia, has been in my experiments uncertain; sometimes distinct, although very fugacious, and sometimes imperceptible Twenty cubic centimetres of a 10-per-cent. solution of aqua ammoniæ fortior (U. S. Pharmacopœia), in some cases produced an immediate rise in the arterial pressure, and even fugaciously registered itself in the respiratory rate, but perhaps more frequently it failed in its influence.

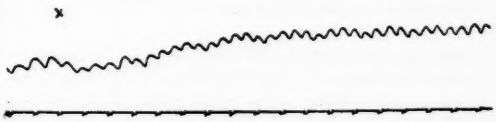
FIG. 7.



Injection of twenty cubic centimetres of a 10-per-cent. solution of aqua ammoniæ fortior. Injection given just after beginning of tracing.

The influence of injections of digitalis has been, in a number of experiments, very pronounced in producing a persistent gradual rise of the arterial pressure with an increase in the size of the individual pulse-rate In several instances, death was apparently averted by its injection, and I saw in one or two cases, where large amounts of the digitalis had been employed, sudden systolic cardiac arrest, indicating that digitalis, if in sufficient amount, is able to assert itself victoriously in opposition to chloroform. Moreover, when I have given chloroform to dogs whose hearts were already under the influence of digitalis, there has seemed to be a peculiar steadying or sustaining power combating the circulatory depression naturally produced by the anæsthetic, and I believe that in all cases of weak heart in man a full dose of digitalis before the administration of chloroform would greatly lessen the danger of cardiac collapse.

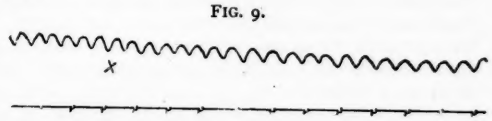
FIG. 8.



Tracing showing effect of five cubic centimetres of tincture of digitalis in advanced chloroform anæsthesia. Injection given at X.

With the nitrite of amyl four experiments were made; in some of these from 4 to 10 drops of the nitrite of amyl were injected in the jugular vein; in others the nitrite was used by inhalation. No distinct effect upon the arterial pressure was in any instance produced, and usually no alteration in the size of the pulse-waves, although sometimes the pulse did appear to be a little fuller.

FIG. 9.



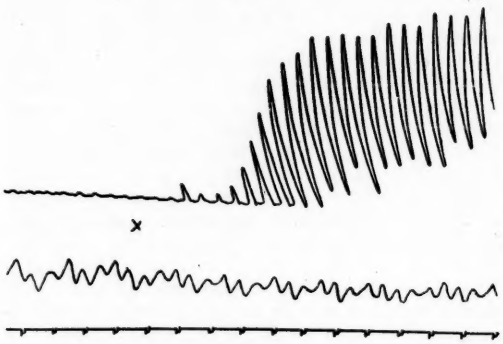
Tracing showing effect of nitrite of amyl, given freely by inhalation, upon the circulation. Inhalation begun at X.

Of all my experimental results, those which have been reached with strychnine have been the most surprising. The injection of strychnine into the jugular vein usually produced a gradual rise of the arterial pressure, and always caused an extraordinary and rapid increase in the rate and extent of the respiration. Thus I have seen the respiration, which had practically ceased for ten seconds, suddenly, under the influence of an injection of two-tenths of a grain of strychnine, become at once very large and full, and reach a rate of 130 a minute.

A series of elaborate experiments made upon the effect of the position of the animal on the blood-pressure in the carotid and other arteries, has very clearly proven that the body of the animal whose circulation has been

paralyzed by chloroform, acts in a measure like a tube filled with fluid. Thus, if the feet of the dog were raised vertically above the head, whilst the latter remained upon the table, an immediate rise of pressure occurred, even though the heart had entirely ceased beating; provided that the head of the animal was kept upon a

FIG. 10.



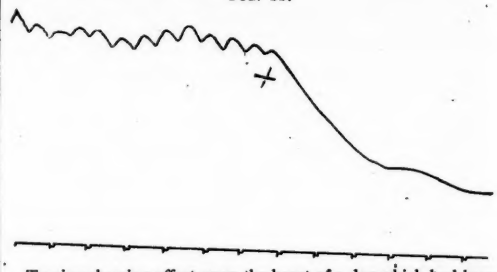
Tracing showing effect of injection of strychnine, after breathing had ceased, in an advanced chloroform anæsthesia. 0.193 grain of the sulphate was injected at X.

level with the table. If, however, the head of the animal was depressed below the level of the table for a distance equal to, or greater than the length of the body of the animal, a decrease of the arterial pressure occurred at once, although the animal was in a vertical position. The phenomena observed were precisely such as would have been produced if the canula had been inserted into a tube filled with fluid, instead of into the carotid artery, and the elevation and depression of this tube had registered itself on the recording drum, in obedience to the ordinary laws of hydrostatics. The phenomena were entirely independent of any beat of the heart, and were readily produced when the animal was dead, provided the death had not occurred too long previously. Sometimes, even a very few minutes after the cessation of the heart-beat, it was impossible to produce the changes of pressure upon the drum. This I believe to have been due to coagulation of the blood, occurring very early after death to a sufficient extent to interfere with the liquid properties of the fluid. In no case was any effect upon the respiration produced by change in position of the animal. In a number of cases, however, when the feet were elevated, the heart, which had entirely ceased beating, recommenced its work, and I have several times seen a pulse entirely disappear when the animal was taken from the vertical to the horizontal position. On the other hand, very frequently it was impossible to affect the cardiac action by changing the position of the animal. Nevertheless, the phenomena spoken of occurred too frequently to be a mere outcome of chance, though I several times noted that the heart was usually more affected by alternately elevating and depressing the feet of the animal, than by keeping it in a steadily elevated or horizontal position.

When the circulation has practically ceased, under the depressing influence of an anæsthetic, inverting the body must cause the blood which has naturally collected in the enormously relaxed vessels of the abdomen, to flow into the right side of the heart and distend it, and this distention—this increase of pressure—appears at times to have a sufficient momentary influence to stimulate the failing organ.

The theory which has been advocated by some therapeutists, that inversion of the body is of value in the accidents of anæsthesia, because it causes the vital centres of the brain to be supplied with blood, is proba-

FIG. 11.



Tracing showing effect upon the heart of a dog which had been vertical, with his head on level of the table, of bringing him into horizontal position. Feet dropped at X.

bly incorrect. The respiration in anæsthesia fails, not through want of blood in the respiratory centres, but because the blood contains a poison which paralyzes these centres.

The most remarkable results which I have reached in bringing about recovery of animals to all ordinary intents and purposes dead, were obtained through the use of artificial respiration. Thus, I have seen an animal, in which no respiratory movements whatever had taken place for two minutes, and in which, during that time, no movements of blood had occurred in the carotid artery, and in which, therefore, the heart had ceased to beat, rapidly and permanently restored by artificial respiration.

At one time in these researches, it appeared as though after any dose of chloroform by inhalation the animal could be resuscitated by artificial respiration, even though heart and lungs were completely paralyzed by the drug; but finally I did find a case in which artificial respiration failed.

The results of my experiments with the lower animals may be summed up: that nitrite of amyl, caffeine, and atropine are of little or no use in chloroform-poisoning; that alcohol, when given in small amounts, has no influence, but that when given largely materially assists in paralyzing the heart and producing fatal results; that ammonia has some little influence upon the heart, but that of all substances tried, digitalis is by far the most powerful in stimulating the failing circulation; indeed, my experimental results indicate that it is the only known drug which is of any real practical value in such cases. Next, or perhaps even before digitalis, strychnine seems to be of value in the accidents of anæsthesia, because, whilst having some influence on the circulation, it powerfully affects the respiration. For many years chloroform has been used in practical medicine as the physiological and practical antagonist to strychnine, and it seems rather odd that strychnine should

never have been employed as the practical antagonist to chloroform.

The one measure which in practical value far surpassed all others for the restoration of the dying animal was artificial respiration, and I have no doubt that a great majority of the deaths which have occurred in man from anæsthesia might have been avoided by the use of an active artificial respiration. The difficulty with artificial respiration as it has been hitherto practised upon man, after the Sylvester or other methods, is its inefficiency; whereas the artificial respiration which I used on animals was very active—indeed, much more efficient than natural breathing in causing circulation of air through the lungs, and therefore in removing excess of the anæsthetic from the residual air in the lungs, and from the blood.

The use of what may be called "forced" artificial respiration by the physiologist, so naturally suggested a similar practice in man, that the celebrated John Hunter invented for the purpose an apparatus which consisted of a bellows so constructed that when it was extended one compartment drew in air from the lungs, whilst the other drew air from the atmosphere; and when it was closed the process was reversed, the fresh air being thrown into the lungs, the foul air into the atmosphere. In 1867, Richardson, of London, invented an apparatus more elegant and portable, although identical in principle with that of John Hunter's; but I have not found that either Hunter or Richardson treated by forced artificial respiration an actual case of disease or poisoning. In 1875 (*Boston Medical Journal*, vol. xxi.), Dr. John Ellis Blake reported a successful case of aconite-poisoning, in which life was apparently saved, although there was no pulse for over three hours, by artificial respiration, with the use of oxygen. In this case Marshall Hall's method was at first used, but later, a small rubber tube was connected directly with a copper reservoir of condensed oxygen, the other end of the tube terminating in a small nozzle, which was inserted in one nostril. Four hundred gallons of oxygen were thus used, but how far the force of the compressed gas was employed to dilate the lungs is not very clear; and it is somewhat doubtful whether this case should be considered as one of forced respiration. The first physician to use forced respiration in actual human poisoning, with a clear idea of its value and power, so far as my reading goes, was Dr. George E. Fell (*International Medical Congress*, Washington, 1887).

It is plain that the bellows constructed by John Hunter and by Richardson are unnecessarily complex and faulty in principle, There is no need whatever of drawing the air out of the fully filled lungs. Every physiologist knows that when the muscular system is completely paralyzed by woorari or even by death, that the chest-walls have sufficient elasticity to force air out of the lungs, and all ordinary laboratory apparatus for artificial respiration is based upon this fact. For forced artificial respiration in man an ordinary bellows of proper size is all that is required for the motive power.

The real difficulty—the point to be especially investigated and studied—is as to the connection between the bellows and the lungs. Hunter and Richardson simply placed a tube in one nostril, closing firmly the other nostril and the mouth of the subject.

Dr. Fell at first used a tracheal tube, the insertion of which, of course, necessitated the performance of tracheotomy. In one case, however, a simple mask covering the mouth and nostrils was a perfect success. I have had no opportunity of trying the apparatus on the living, but have made a series of experiments upon dead bodies, which have demonstrated that usually a face mask is all that is necessary for the performance of artificial respiration. Before using the mask the tongue should be well drawn forward, and, if necessary, fixed in this position by an ordinary piece of suture silk run through it, which can be held in the hand of the operator. If in any individual case the mask fails, an intubation tube may be introduced into the larynx. I do not believe that it is ever necessary to perform tracheotomy.

Dr. Fell's apparatus consists of a pair of foot-bellows by which air is forced into a receiving chamber, which is connected with an apparatus for warming the air, and a valve which can be opened and shut by a movement of the finger. This valve in turn leads to the tracheal tube. When the valve is opened the air rushes through the chamber into the lungs and expands them; the finger is lifted, the valve shuts, the lungs contract; and so the respiration goes on. I have no doubt that this apparatus is very efficient in practice, but it is open to the serious objection of being unnecessarily complex and costly.

A much simpler, cheaper, and probably equally efficient apparatus may consist simply of a pair of bellows of proper size, a few feet of India-rubber tubing, a face mask, and two sizes of intubation tubes; there should also be set in the tubing a double tube, with an opening similar to that commonly found in the tracheal canula of the physiological laboratory, so that it is in the power of the operator to allow for the escape of any excess of air thrown by the bellows. I suppose this whole apparatus could be prepared at the expense of less than five dollars, and it seems hardly necessary to point out the probable value of this simple apparatus in various narcotic poisonings, and other accidents in which death is produced by a paralysis of the respiratory centres, of temporary nature. The proper use of it could be taught to persons without special medical skill, so that it not only ought to form a part of the surgeon's outfit, but might be of great service in life-saving stations, about gas-works, etc.[1]

In conclusion, I may be allowed to state, that if the results and deductions arrived at in this address are, as I believe, correct, the rules for the proper treatment of accidents during anæsthesia can be summed up in a very few words:

Avoid the use of all drugs except digitalis and ammonia.

Give the tincture of digitalis hypodermically.

Draw out the tongue, and raise up the angle of the jaw, and see that the respiration is not mechanically impeded.

Invert the patient briefly and temporarily.

Use forçed artificial respiration promptly, and in protracted cases employ external warmth and stimulation of the surface by the dry electric brush, etc., and above all,

[1] Messrs. Charles Lentz & Sons, Philadelphia, can furnish the apparatus for artificial respiration at a cost of $8.50.

remember that some at least, and probably many of the deaths which have been set down as due to chloroform and ether, have been produced by the alcohol which was given for the relief of the patient.

INTERNATIONAL UNIFORMITY IN ARMY MEDICAL STATISTICS.

An Address delivered before the Section of Military Hygiene, Tenth International Medical Congress, Berlin, August 7, 1890.

BY JOHN S. BILLINGS, M.D., LL.D.,
SURGEON UNITED STATES ARMY.

"CAN the sick-lists and sanitary reports in the different armies be made up after a pattern uniform at least in essentials, in order to obtain statistics which may furnish data of scientific worth for comparing diseases, wounds, and deaths occurring in the different armies in times of peace and war?"

In attempting to comply with the request with which I have been honored, that I should prepare a paper in answer to this question, I propose to consider the subject under the following heads:

I. What are the most important data which can be obtained for the preparation of such statistics?

II. What are the principal combinations of these data which have been given in army medical statistics heretofore published?

III. Which of these data, or combinations of data, are most important to the individual command or army, or country, for purposes of military administration?

IV. What are the most desirable combinations of these data for publication for the purpose of increasing our knowledge of the laws of health and disease by comparison of the mortality and morbidity statistics of different armies in times of peace and war?

V. What forms of returns and reports are best calculated to secure the data desired, as specified under III. and IV., *supra*, with accuracy, promptness, and completeness?

VI. Will it probably be possible to induce the different Governments to agree to a uniform system of publication of the data and combinations of data recommended as desirable in answer to question IV.?

Let us consider these several points in the order stated, and for the sake of brevity and simplicity I shall first speak with regard to diseases only, and as to those occurring in times of comparative peace.

The data given in the reports of army medical officers relating to individuals taken sick or injured, relate to

1. Locality of the post.
2. Arm of the service, as { Artillery. Cavalry. Infantry, etc.
3. Rank—*i. e.*, { Commissioned officers. Non-commissioned officers. Privates.
4. Occupation prior to enlistment.
5. Length of service.
6. Age of the individual.
7. Race or nationality (including color distinction).
8. The date of occurrence of the disease or injury.
9. The nature of the disease or injury.
10. Complications and sequelæ of the disease or injury.
11. Results, including length of time of treatment required:
    - *a.* Returned to duty.
    - *b.* Transferred.
    - *c.* Discharged.
    - *d.* Invalided.
    - *e.* Died.
    - *f.* Otherwise disposed of.

Of these the most important in the order named are the nature of the disease or injury; the result; age; date of occurrence of affection; the number of days of treatment; locality of the post or station; the period of the year; the length of service; the arm of service; rank; race; and occupation prior to service. To permit of comparisons and the calculation of percentages, there is also needed information as to the mean strength of the command during the period under consideration, with distinction of arm of service, rank, and color, and for some purposes with distinction of age, race, or nationality, length of service, and previous occupation.[1]

The following are the formulæ of some of the tables occupying the greatest amount of space in the published medical statistics of different armies. The data indicated by the letters are shown in the foot-note, the exponential figures after certain letters show the number of subdivisions of that item, thus: C (199) indicates that the figures are given for 199 different causes of admission to sick report. L (53), that they are given for 53 different localities, etc. The symbols to the left of the perpendicular line indicate the headings in the first or left-hand column of the table, while those to the right of the same line show the headings at the top of the remaining columns:

Austrian Army.

C. (194)	T. t. / D.	L. (16) + A. S. (11).	4 pages quarto.
C. (194)	T. t. / D.	A. S. / L.	36 pages quarto.

[1] The following are the abbreviations used to designate these data in the formulæ of tables given hereafter:

A.	Age.
Ad.	Admission.
A. S.	Arm of Service: Infantry, Cavalry, etc.
C.	Cause of admission to treatment.
Col.	Color.
D.	Deaths.
Di.	Discharged.
D. t.	Days treated.
Du.	Returned to duty.
I.	Invalided.
L.	Locality.
L. S.	Length of Service.
M.	Months.
M. S.	Mean Strength.
O.	Occupation prior to enlistment.
O. d.	Otherwise disposed of.
R.	Remaining on hand.
Rnk.	Rank: Commissioned Officers, Non-commissioned Officers, Privates.
S.	Seasons.
T. d.	Total disposed of.
Tr.	Transferred.
T. t.	Total treated.

Bavarian Army.

C. (199) | $R. + \frac{Ad.}{M.} + \frac{T.d.}{Du. + D - O.d.} + R. + D.t.$ — 36 pages quarto.

L. (53) | $M.S. + Ad. + D. + \frac{C.(37)}{Ad. + D.} + Di. + I.$ — 10 pages quarto.

Belgian Army.

C. (24) | Ad. + T. d. + D. + D. t. — For 22 localities in separate tables. 11 pages octavo.

C. (185) | Ad. + T. d. + D + D. t. — 5 pages octavo.

British Army.

{M. S. / C. (39)} | Ad. + D. + (Di. + I.). — Separate tables for 29 principal localities and many subdivisions of localities. 62 pages octavo.

A. (7) | M. S. + Ad. + D. + I.

L. S. (8) | M. S. + Ad. + D. + I.

A. S. | M. S. + Ad. + D. + I. + L. — 40 pages octavo.

French Army.

M. S. | L. (377).

C. (27) | $\frac{L.(377)}{Ad. + D.}$ — 45 pages quarto.

D. t. | L. (377).

A.S. (10) | $\frac{M.S.}{Rnk.(3) + L.S.(2) + A.} + Ad. + D.t. + I. + D.$ — 46 pages quarto.

C. (27) | $R + \frac{Ad.}{Rnk.(3)} + L.S.(2) + T.t. + D.t. + A.S.(24).$ — 2 pages quarto.

German Army.

C. (199) | $R + \frac{Ad.}{M.} + \frac{T.d.}{Du. + D. + O.d.} + R. + D.t.$ — 15 pages quarto.

L. (319) | $M.S. + A.d. + D. + \frac{C.(37)}{Ad. + D.} + Di. + I.$ — 53 pages quarto.

M. | $M.S. + \frac{Ad.}{C.(37)}$ for each of 16 army corps. — 46 pages octavo.

Italian Army.

A. S. | M. S. + Ad. + D. + Di. + D. t. — 30 pages octavo.

C. (102) | L (93) + Ad. — 12 pages octavo.

C. (102) | L. (93) + Ad. — 12 pages octavo.

Netherlands Army.

L. (37) | $\frac{C.(24)}{Ad.}$ — 2 pages octavo.

U. S. Army.

C. (46) | $\frac{L.(182)}{Ad. + D. + Di.}$ — 74 pages octavo.

L. (182) | $M.S. + \frac{C.(2)}{Ad.} + Di. + D.$ — 20 pages octavo.

The principal combinations of data heretofore used in regular periodical reports, including both those relating to the sick and injured, and to all men of the command, are shown in the following tables, which indicate the data, and combinations of data, given in medical statistical reports of the Austrian, Bavarian, Belgian, British, French, German, Italian, Netherlands, and United States armies in recent years:

		Austrian army.	Bavarian army.	Belgian army.	British army.	French army.	German army.	Italian army.	Netherlands army.	U. S. army.
Mean strength			O	O	O	O	O	O		O
×Age					O	O				×
×Arm of serv.			×	×	×	O	×	×		
×Length of serv.					O	O				×
×Localities			×	×	×		×	×		×
×Months			×					×		O
×Occupation			×							
×Race										×
×Rank						O				
×Age	×Arm of serv.				×	×				
×Age	×Localities				×					
×Arm of serv.	×Length of serv.					×				
×Arm of serv.	×Localities				×					
×Arm of serv.	×Rank					×				
×Length of serv.	×Localities				×					
×Months	×Race									×
Admitted			O	O	O	O	O	O	O	O
×Age					O					O
×Arm of serv.			×	O	×	×	×	×		
×Cause			O	×	O	O	×	O	×	O
×Length of serv.					O					O
×Localities			×	×	×	O	O	×	O	×
×Months			O				O	×		O
×Occupation			O							
×Race										O
×Rank						O				
×Age	×Cause									×
×Age	×Localities				×					
×Arm of serv.	×Cause				×			×		
×Arm of serv.	×Localities				×	×				
×Cause	×Length of serv.									×
×Cause	×Localities		×	×	×	×	×	×	×	×
×Cause	×Months		×				×	O		O
×Cause	×Occupation		×							
×Cause	×Race									×
×Cause	×Rank					×				
×Length of serv.	×Localities				×					
×Localities	×Months							×		
×Months	×Race									O
×Cause ×Localities ×Months								×		
×Cause ×Months ×Race										×
Died		O	O	O	O	O	O	O	O	O
×Age			O	O	O	O	O	O		O
×Arm of serv.		O	×	O	×	×	×	×	×	
×Cause		O	×	O	O	O	×	×	O	O
×Length of serv.			O	O	O		O	O		O
×Localities		O.	O	×	×	O	O	×	O	×
×Months		O	O			O	O	×		
×Quarterly periods.									O	
×Race										O
×Rank		O	O	O		O	O	O		
×Religion		O								
×Age	×Arm of serv.				×					
×Age	×Cause		×			×	×	×		×
×Age	×Localities			×	×					
×Arm of serv.	×Cause	O	×	×		×	×	×		
×Arm of serv.	×Length of serv.	×								
×Arm of serv.	×Localities	×			×					
×Arm of serv.	×Quart. periods								×	
×Arm of serv.	×Rank	×					×			
×Arm of serv.	×Religion	×								
×Cause	×Length of serv.		×				×	×		×
×Cause	×Localities	O	×	×	×	×	×	×	×	×
×Cause	×Months	×	×			O	×			
×Cause	×Quart. periods								×	
×Cause	×Race									×
×Cause	×Rank		×			×	×	×		
×Length of serv.	×Localities			×	×					
×Localities	×Months					O		×		
×Localities	×Rank			×						
×Arm of serv. ×Cause ×Localities		×								
×Cause ×Localities ×Months						×				
Discharged or invalided		O	O	O	O	O	O	O	O	O
×Age			×		O		×	O		O
×Arm of serv.		O	×	×	×	×	×	×	×	
×Cause		O	O		O	O	O	O	O	O
×Length of serv.		O	×	×	O		×	O		O
×Localities			×		×		×	×		×
×Months								×		
×Quart. per.									O	
×Race										O
×Rank		O	×				×			
×Religion		O								
×Age	×Cause							×		×
×Age	×Localities				×					
×Arm of serv.	×Cause	×				×				
×Arm of serv.	×Length of serv	×								
×Arm of serv.	×Localities				×					
×Arm of serv.	×Quart. periods.								×	
×Arm of serv.	×Rank	×								
×Arm of serv.	×Religion	×								
×Cause	×Length of serv.		×				×	×		×

		Austrian army.	Bavarian army.	Belgian army.	British army.	French army.	German army.	Italian army.	Netherlands army.	U. S. army.
Discharged or invalided										
×Cause	×Localities				×					×
×Cause	×Months							×	×	
×Cause	×Quart. periods.									×
×Cause	×Race									
×Cause	×Rank				×	×				
×Length of serv.	×Localities		0				0	0	0	
Returned to duty			×				×		×	
×Arm of serv.			×				×			
×Cause								0		
×Localities								0		
×Months								×		
×Localities	×Months	0	0			0	0	0	0	
Total treated		0	×			×	×		×	
×Arm of serv.		0	×					×		
×Cause		0								
×Localities		0								
×Months		0								
×Arm of serv.	×Cause	0								
×Arm of serv.	×Localities	0								
×Cause	×Localities	×								
×Cause	×Months	×								
×Arm of serv.	×Cause ×Localities	×								
Total disposed of				×				×	×	
×Cause										
×Localities										
Causes				0	×	0	0	0	0	×
×Admitted	×Age								×	
×Admitted	×Arm of serv.				×					
×Admitted	×Length of serv.									
×Admitted	×Localities			×	×	×	×	×	×	×
×Admitted	×Months			×				×	0	
×Admitted	×Occupation			×						0
×Admitted	×Race						×			
×Admitted	×Rank								×	
×Admitted	×Localities ×Months									
×Admitted	×Months ×Race								0	0
×Died		0	×	×	0	0	0	×	×	×
×Died	×Age	0	×	×			×	×	×	
×Died	×Arm of serv.			×	×					
×Died	×Days treated				×					
×Died	×Length of serv.			×				×	×	
×Died	×Localities	0	×	×	×	×	×	×		×
×Died	×Months	×	×	×			0	×	×	
×Died	×Quart. periods									×
×Died	×Race						×	×	×	
×Died	×Rank			×						
×Died	×Arm of serv. ×Localities	×					×			
×Died	×Localities ×Months							×		
×Duty; cured		0	0		0	0	0	0	0	0
×Disch. or inv.									×	×
×Discharged, etc.	×Age	×					×			
×Discharged, etc.	×Arm of serv.							×	×	×
×Discharged, etc.	×Length of serv.			×					×	×
×Discharged, etc.	×Localities					×				
×Discharged, etc.	×Months								×	
×Discharged, etc.	×Quart. periods						×			
×Discharged, etc.	×Race							×		
×Discharged, etc.	×Rank		0							
×Total treated			0							
×Total treated	×Arm of serv.		0							
×Total treated	×Localities		×							
×Total treated	×Months		×							
×Total treated	×Arm of S ×Loc.		×					×	×	
×Days' treatment				×	0					×
×Days' treatment	×Localities			×					×	
×Total disposed of										×
Ages							0	0		
×Mean strength	×Arm of serv.						×	×		
×Mean strength	×Localities						0			0
×Admissions										×
×Admissions	×Cause						×			
×Admissions	×Localities			0	0	0	0	0	0	0
×Died							×	×	×	×
×Died	×Arm of serv.				×					
×Died	×Cause					×	×			
×Died	×Localities				×		0		×	0
×Disch. or inv.										×
×Disch. or inv.	×Cause						×			
×Disch. or inv.	×Localities			0	0			0	0	0
Days' treatment					×	×		×	×	
×Arm of serv.					×	0		×	×	
×Cause						×				×
×Locality										×
×Months										×
×Race						×				
×Cause	×Localities									
Occupation					×					
×Mean strength					×					
×Admitted										

		Austrian army.	Bavarian army.	Belgian army.	British army.	French army.	German army.	Italian army.	Netherlands army.	U. S. army.
Occupation										
×Causes			×							
×(Died, invalided, and discharged)			×		0	0				0
Length of service					0	0				×
×Mean strength						×				
×Mean strength	×Arm of serv.					0				0
×Mean strength	×Localities									×
×Admitted										
×Admitted	×Cause				×					
×Admitted	×Localities	0	0	0	0		0	0		0
×Died		×								
×Died	×Arm of serv.		×			×	×	×		×
×Died	×Cause			×	×					
×Died	×Localities	0	0		0		0	0		0
×Disch. or inv.		×								
×Disch. or inv.	×Arm of serv.		×				×	×		×
×Disch. or inv.	×Cause					×				
×Disch. or inv.	×Localities									

In the above tables the cross indicates that the special data, or combination of data, indicated in the left-hand column, are given in the statistical reports of the medical department of the army indicated in the heading of the perpendicular column. The circle indicates that the data, though not given directly, are given in some other combination indicated by a cross in the same column. It will be seen, for example, that the important datum of age is only given for the mean strength of the commands in the periodical reports of the French, British, and United States armies, and that, therefore, it is impossible for all other armies to make comparisons as to the proportion of soldiers of each group of ages who are affected with disease or injury. The age-grouping of those taken on sick report is given only in recent annual reports of the British and United States armies; it is given for those discharged or invalided in the German, Italian, Bavarian, British, and American reports only; for those who died, in the German, Bavarian, French, Belgian, British, American, and Italian reports, and it is not given at all in any army medical report in relation to the average number of days of treatment. Moreover, the age-groupings used in different army reports do not correspond to each other, nor, which is more important, to the age-groupings used in published vital statistics of civil life, as will be seen by the following table:

TABLE SHOWING AGE-GROUPINGS IN DIFFERENT ARMY MEDICAL REPORTS.

Ages.	Bavar'n army.	Belgian army.	British army.	French army.	German army.	Italian army.	U. S. army.
11–15		×					
15		×			×		×
17	×		×	×		×	
18		×			×		
19		×			×	×	
20	×	×			×		×
21	×	×	×	×	×	×	
22	×	×				×	
23	×	×				×	×
24		×	×				×
25–30	×	×	×			×	×
30–35		×	×				×
35–40		×		×	×		×
40–45		×				×	×
45–50	×	×	×				×
50–55		×					×
55–60		×					
60 +		×					

Keeping before us this bird's-view of what has been attempted in published military medical statistics, let us proceed to our third question, viz.: Which of these data, or combinations of data, are most important for local military administration?

Evidently they are those which show the actual effective strength of the command, and the causes of its diminution. The actual number on sick report, the number returned to duty, died, discharged or transferred must be given on the daily, weekly, and monthly reports for the immediate information of commanding officers. We need only consider the tables to be published, which will, for the most part, be yearly summaries relating to the total treated or excused from duty during the period to which they relate. The distinction between the "number admitted," the "number treated," and the "number disposed of" must be borne in mind, for these are not the same—they have different statistical uses and values—and cannot be directly compared with each other. The "number treated" includes the number remaining under treatment at the beginning of the period and the number admitted during the period. Those remaining under treatment at the end of the period are, of course, included in this sum. It is, therefore, greater than the "number admitted," and in most cases greater than the "number disposed of." The number of admissions may be either equal to, or greater or less than the "number disposed of," depending on the difference between the number under treatment at the commencement and the number remaining under treatment at the close of the period. The form of table most useful for these administrative statistics is one like the following, which

Station..... Period .....

Mean strength of the command:

Officers..... Enlisted men..... Total strength.....

Tabular List of Diseases. The names of diseases not printed below, and the number occurring during the month, will be written under the class to which they belong.	Remaining under treatment from last report.	Admitted.	Total treated.	Number of days' treatment.	Returned to duty.	Discharged or invalided.	Died.	Otherwise disposed of.	Remaining under treatment.
Smallpox									
Other acute contagious fevers									
Diarrhœa									
Dysentery									
Typhoid fever									
Malarial fever									
Venereal—Primary syphilis									
Venereal—Secondary "									
Venereal—Gonorrhœa									
Septic diseases									
Pulmonary phthisis									
Other tubercular diseases									
Etc.									

shows for the command the mean strength, number taken on sick report, number died, number discharged, number transferred or otherwise disposed of, average number of days sickness to each soldier, with distinction of certain causes or groups of causes.

Such tables may be given in more or less detail, for each month or year, for different localities, regions, ranks, arms of service, for those under and over one year in service, or for other units of military administration. The death-rates and discharge-rates may be given for these units, but for most individual causes of sickness or death the numbers are too small to make it worth while to calculate ratios except for groups including 25,000 men and upward, or for periods of five or ten years. The ratios derivable from half a dozen cases, or less than half a dozen deaths, are, for the most part, of little value, owing to the law of probable error in relation to number of individual data, although it would be easy to indicate possible exceptions to this rule. It appears to me that it is sufficient to publish details as to causes for separate posts and garrisons, and for months or seasons, by periods of five or even of ten years. The statistics of principal causes of disease in relation to locality would certainly have more scientific value if compiled for the longer period, in connection with the information derived from sanitary reports as to soil, climate, altitude, drainage, water-supply, buildings, duties of troops, etc.

The particular forms of disease of most interest in the administrative point of view, can best be discussed in connection with my fourth question, viz.: What combinations of these data are most desirable in publication for the purpose of making reliable and useful comparisons of the medical statistics of different armies in times of peace and war respectively?

These are the statistics which are to be published a long time after the events with which they are concerned have occurred, and whose importance, for the purpose of international comparison, is in proportion to the possibility of increasing by them our general stock of knowledge of the laws of health and disease.

We have to consider death-rates and sick-rates, mortality, and morbidity. As regards general or gross death-rates, they depend so much upon the proportion of discharges for disability, which in turn depend upon whether service is voluntary or compulsory, and for long or short terms, that for armies which differ in these respects no useful comparisons can be made. The death-rates from acute forms of disease in armies are much more valuable for purposes of comparison with each other and with the corresponding rates in civil life, but for the latter purpose they should be given by age-groups. The special value of army medical statistics for scientific purposes lies in the sick-rates, for these are our chief source of information with regard to the number of cases of disease occurring in a given number of adult males in a given time under different conditions of climate, locality, etc. General or gross morbidity rates in armies are not valuable for purposes of comparison unless they include substantially the same class of facts. Where the soldier is officially taken up on the sick report whenever treated by the medical officer, no matter for how short a time, or for how trivial a cause, or whether excused from all duty or not, the

sickness-rate will, of course, be higher than where this is not the case. It is in the special sickness-rates and death-rates, due to certain diseases or groups of diseases, and in the relation of these to age, nationality, race, season, and conditions of environment, that the scientific value of army medical statistics chiefly consists.

What are these diseases or groups of diseases which are thus specially important, and the data for which should be rendered comparable in the published reports of different armies?

As regards individual forms of disease, the most important, and those for which the data are in most of the published reports given in more or less detail are the following, viz., smallpox, typhoid fever, diarrhœa, dysentery, malarial fevers, syphilis, gonorrhœa, pulmonary phthisis, pneumonia, acute bronchitis, tonsillitis, scurvy, alcoholism, diabetes, rheumatism, malignant tumors, mental disorders, and suicides.

Let us consider these briefly. The statistics of smallpox in an army indicate the relative completeness with which vaccination and revaccination have been carried out among the men, and thus furnish a test of the administrative efficiency of the medical department, and a demonstration of the importance of these measures in civil life; but there is no probability that the army statistics of this disease will add materially to our knowledge of its causes, pathology, or treatment. It is useless to give details with regard to the cases. All that need be stated is the total number of cases, number of deaths, and the condition of the command, and of those affected, as to vaccination. The number of cases of typhoid fever, diarrhœa, and dysentery, form the chief test as to the character of the water supplies. Recent advances in bacteriology have made it improbable that the most elaborate statistics of these affections will materially increase our knowledge as to their causes or pathology, though the field is still open for the collection of data as regards sequelæ and treatment. Here again, then, the statistics must be considered to be chiefly useful as a means of measuring local efficiency of administration, and of testing results obtained in the laboratory.

With regard to typhoid fever there is one important question which might be answered from army medical records, and that is as to the amount, or proportion, of immunity conferred by the first attack of this disease. What proportion of men subjected to the influence of the specific cause of typhoid are attacked a second or a third time by this disease, at what ages, and at what length of time from the previous attack? To answer this question it will be necessary to make a special inquiry with regard to each man serving at a post in which typhoid fever prevails, noting whether he states that he has or has not had this disease, in case of an affirmative answer, when and where, and the duration and severity of the attack, his present age, and his length of service.

In many cases the answers would no doubt be vague or unreliable in themselves, but in many such cases, by referring to previous army medical records, or by correspondence with the physician who is said to have attended him, it would be possible to ascertain whether the disease was really typhoid or not. The results of such an inquiry can only be approximate, but they would certainly be interesting and valuable. By the system of card records, which will be described hereafter, the results of a series of years of experience on this point would be brought together.

The statistics of malarial fevers are chiefly interesting in their relations to locality and as contributions to geographical pathology. Differences of race, and especially of color where these occur, should be indicated in such statistics, but elaborate combinations of rank, length of service, previous occupation, etc., cannot be expected to increase our information with regard to these diseases.

The statistics of venereal disease in armies are of general as well as of local importance, since they furnish data from which to judge of the merits of various schemes which are proposed for their diminution in civil life. The statistics of scurvy, like those of smallpox, are merely a test of the efficiency of the administration of an army, and cannot be expected to add to our knowledge of this disease, except, possibly, as regards methods of treatment. The statistics of alcoholism, while chiefly important as bearing on local administration, have also a considerable value from a sociological point of view, and should be given in some detail by groups of ages, with distinction of rank and of arm of service, and, as far as possible, the results observed. The distinction between acute and chronic alcoholism should be insisted on.

For pulmonary phthisis, and, in fact, for tubercular diseases in general, the recent advances in our knowledge as to the essential cause enables us to put more definite questions than was heretofore possible, which may be answered, to some extent, at least, by army medical statistics. The prevalence of this disease in a body of troops taken in conjunction with the statistics of cases of inflammatory affections of the throat, such as tonsillitis, affords a very good test as to the efficiency of the ventilation of the barracks and quarters of the men. It is not meant by this to assert that defective ventilation is the only cause of these affections, but, whenever they are found to prevail in unusual proportions, it will usually be found that the men have been unduly exposed to a defective and impure air supply.

The number of cases of insanity and suicide attempted or effective which occur in an army are of special interest when the data are given in connection with distinctions of age, race, rank, and length of service. If given for comparatively short periods, as for a single year, the numbers are usually insufficient to do more than indicate points to be especially attended to in administration. It is for periods of five or ten years that statistics of these affections are the most likely to be of scientific value and interest. The same may be said with regard to statistics of tumors of all kinds, and especially of the malignant forms of the sarcomas, myxomas, and true epitheliomatous growths. It is known that these occur in different proportions in different races and at different groups of ages. But there are many points in regard to this class of affections in relation to which an international statistic, derived from the records of the large armies of different countries for a period of years, indicating their relative frequency in different parts of the body, etc., would be of great interest.

(*To be continued.*)

ORIGINAL ARTICLES.

CLINICAL OBSERVATIONS ON DIPHTHERIA AND DIPHTHERITIC PARALYSIS, WITH SPECIAL REFERENCE TO TREATMENT.[1]

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DURING the last winter and spring diphtheria prevailed quite extensively in Philadelphia. It was probably not as virulent and fatal a type of the disease as has prevailed at some other times, but it nevertheless caused many deaths. Variations in its severity make it difficult to estimate with accuracy the merits of different plans of treatment, and may also have something to do with variations in the prevalence of one of the most formidable complications of the disease, namely, paralysis. Observation and inquiry have led me to believe that this particular sequela (or as I prefer to call it, complication) has been noted rather more frequently of late than in former years; but I do not infer from this fact that paralysis is a more common result than formerly, but, rather, that the complication in minor degrees is more readily recognized by the practitioner, because of the more general cultivation of neurological science.

Although more than twenty years have passed since Oertel announced that a micrococcus was always present in the membrane and in the blood of diphtheritic patients, and broadly stated that "without micrococci there can be no diphtheria," the time has not yet come for us to abandon the clinical for the bacteriological study of this important disease. The weight of opinion seems to be that the specific poison of diphtheria is either a bacterium or the ptomaine generated by it. This gives us at least a working theory, upon which we can hope to establish, if not a specific, at least an active and even aggressive treatment. For the rest we must be content to leave the, perhaps yet unsolved, problem of the exact form and habits of the specific microbe to the numerous workers in this field of medical research.

The pathology and morbid anatomy of diphtheria, especially in the cerebro-spinal system, while a question of great interest, is not one which will especially detain me. The action of this poison, whatever it is, upon nerve-tissue is so distinctly like that of other morbific agents whose action is fairly well known, that there is little doubt that it acts especially upon what Gowers calls the "lower segment" of the nervous system; that is, the large cells in the anterior horns and the nerve-fibres running out from them to form the nerve-trunks. That some observers have located the lesions in the horns and others in the nerve-fibres only furnishes additional evidence that these two parts form really one anatomical organ, and that the diphtheritic poison acts probably upon the whole. It might even be claimed on good clinical evidence that it is a general protoplasmic poison, which does not confine itself to one group of cells, just as arsenic, alcohol, and some other substances, whose effects upon nerve-tissue are not unlike those of diphtheritic poison, are known to attack many tissues of the body.

The similarity of action upon the peripheral nervous system of these several poisons seems to me to furnish some important indications not only for treatment, but, what is of equal importance, for prevention, and finally for prognosis. The clinical picture of a peripheral neuritis—with perhaps also an associated anterior poliomyelitis—is perfectly delineated in post-diphtheritic paralysis, and associates it at once with the general peripheral neuritis which in recent years has been so successfully studied. From this association we gain additional insight into pathology and some important hints in therapeutics.

If, in the first place, we may assume that a violent protoplasmic poison is being generated in the body, we have the first and I believe the most important indication, viz., to prevent its generation, as far as possible, by early local treatment. Secondly, having the lesions of a peripheral neuritis, we have some ground upon which to base an intelligent prognosis, and an efficient, although somewhat expectant, treatment.

As this scheme includes of necessity the treatment of the primary disease, I desire to offer a few observations on the subject.

Chlorate of potassium seems to be losing the confidence of the profession in the treatment of diphtheria, because it is known to have, in large doses, an injurious effect upon the kidneys. Some therapeutists even say that it is responsible for some of the deaths in this disease. It is probably a safe drug if given in doses aggregating less than a drachm a day to young children—the condition of the urine being watched. I speak of it now only to recommend as a substitute the chloride of ammonium. I have observed the use of this remedy in diphtheria for twelve years, and know of its successful use by another practitioner for a much longer period. Our knowledge of the effects of chloride of ammonium, as of chlorate of potassium, in a specific disease like diphtheria is mostly empirical, and on this basis I feel justified in saying that the former will do all that the latter drug can do and without its injurious effects. The physiological action, however, of chloride of ammonium[1] indicates, to a certain extent, its therapeutic use. It

[1] Read at the annual meeting of the American Neurological Association, Philadelphia, June 5, 1890.

[1] See Ringer's Therapeutics.

acts as a stimulant to the mucous membrane, increasing the normal secretion and so diluting and dissolving thick, tenacious mucus and fibrinous masses. That it has any true antiseptic action, either locally or in the blood, cannot be affirmed, and the same must be said of the chlorate of potassium in safe therapeutic doses. It is eliminated unchanged in the urine,[1] and without any apparent irritating effects upon the kidneys. The chloride of ammonium makes an admirable mixture with the tincture of the chloride of iron, and in combination with this invaluable drug constitutes a remedy for diphtheria in which experience has taught me to place an unusual degree of confidence. The tincture of the chloride of iron is in itself the one remedy which seems to hold its place in the esteem of every practitioner. Such universal testimony cannot be without great weight. It is most important that this remedy should be applied locally and thoroughly to the membrane. A mixture of one-half drachm each of the iron and of the chloride of ammonium to one ounce of a thick syrup (preferably of tolu) may be administered internally every two hours in teaspoonful doses, and at the same time a soft camel's-hair throat-brush is to be used to apply the mixture thoroughly to the diseased parts. It is not enough to direct the patient to hold the dose in the throat against the soft parts before it is swallowed. Many patients are too young to do so, and no one can do it efficiently. Internally it may be given every hour in bad cases, but the application by the brush every two hours, if done properly, is sufficient. It is very probable that the tincture of the chloride of iron is antiseptic when thus directly applied to the exudate, which we have reason to believe swarms with pathogenic organisms, while the chloride of ammonium, by increasing the mucous secretions of the throat and mouth, assists to dissolve and loosen this mass and promotes its expectoration. All evidence of value furnished by modern research tends to prove that diphtheria begins—and often continues for a long time—as a local affection. It is from this focus that the living germs of the disease gain admission to the lymph-spaces and bloodvessels. It is here that the distillation of protoplasmic poison probably begins, and it is here, reason teaches, that the disease must be combated with vigor at the very outset.

During the past winter I frequently tried the calomel treatment and have confidence in it, but I cannot say that I have seen as prompt results as from the treatment above described. I have usually given a fractional dose (¼ to ⅛ of a grain) every hour or two, according to the severity of the case. I do not believe it necessary or desirable to give the heroic doses recommended by some—5 grains every one or two hours. Such doses weaken the patient by the violent cathartic action almost always excited, and it is doubtful if more constitutional impression is made by these giant doses, as much of the substance is probably not absorbed. It is not certain that calomel acts thus locally as a germicide, and I am positive that its administration should be accompanied with an antiseptic wash or spray to the throat and nose. The substances which are useful for this purpose are boric acid, oxide of lime, sulphur, oil of eucalyptus, and carbolic acid, variously combined. The extract of pancreatin may be added on theoretic principles. In the use of the spray it is of the utmost importance that the nasal chambers be cleansed. To neglect this is to neglect half the field. Although I believe this treatment by calomel is good, I must say that I have seen an obstinate diphtheritic membrane which did not yield to it for a week melt away rapidly under the treatment by iron and ammonia above described.

The corrosive chloride of mercury appears on some accounts to be the model remedy for diphtheria, and it can be used both locally and internally. As an antiseptic spray it probably has no superior. It can be used as strong as 1 to 4000 (and in some cases stronger). The amount which thus enters the stomach is small and promotes the cure. It can be combined for internal use with the tincture of the chloride of iron ($\frac{1}{48}$ to $\frac{1}{24}$ grain in three to eight drops of the iron) and given every two hours. I think that the exceedingly small doses ($\frac{1}{96}$ to $\frac{1}{72}$ grain) recommended by some are of little use unless in the case of very young children. It is necessary, of course, to watch for symptoms of stomachic irritation.

It is not within the scope of this paper to present a complete statement of all forms of treatment which are approved by different authorities. Other germicidal agents than those mentioned are salicylic and carbolic acids and turpentine. The recent researches of Roux and Yersin[1] demonstrate again how important is the local, disinfecting treatment. As between the spray and the brush, I think that the latter is often the more effectual for the fauces, while the spray is necessary for the nasal cavities. Some object that local applications by the brush are irritating and alarming to very young children. In my experience they are not as much so as is the spray through the nose, and can generally be managed with a little tact. Medicated vapors in the room are too dilute to be of any importance.

[1] Parkes, quoted by Ringer.

[1] Revue Mensuelle des Mal. de l'Enf., abstracted in Arch. of Pædiatrics, April, 1890.

The recognition of diphtheritic paralysis as a toxic neuritis, caused by poisonous products of the local disease, demands that this set of symptoms be no longer regarded as a rare sequela of only special interest, but as part of the general symptom-group, some evidence of which may be found in very many more cases of diphtheria than is generally supposed. Bernhart, for instance, pointed out that the knee-jerk is abolished in many cases of diphtheria which do not exhibit distinct paralytic symptoms. This, as Gowers says, is only part of a broader fact. This fact, it must be emphasized, is that a toxic agent begins *early*, and probably in *all* cases, to threaten the integrity of the peripheral nervous system.

Another, and much more alarming symptom, is the heart-failure which so suddenly and with little warning sometimes terminates life. This is probably due to involvement of the vagus—at least, all the symptoms indicate such involvement. It is usually observed earlier than other paralytic symptoms, but it is a mistake to suppose that it never appears after them. I once observed the symptom in a case of multiple neuritis of alcoholic origin; the patient, a woman, suddenly collapsed, and died in a few minutes of heart-failure. The following case illustrates this complication:

A boy, aged seven. The disease began with a chill and sore-throat. In a few hours a membrane began to form on one tonsil, and in two days had spread over both tonsils and the back of the pharynx. There were great enlargement of the glands, earache, and a purulent discharge from the nose. The calomel treatment was actively pushed, the throat and nose frequently sprayed, and careful attention given to his nutrition. By the end of the tenth day the membrane had disappeared, the glandular swelling was gone, the pulse was between 90 and 100, and the patient was convalescent. On the eleventh day he suddenly became sick and began to vomit; had pain in the epigastrium, and grew deadly pale, while his pulse increased in frequency and was very small. Nerve and heart stimulants had not the least effect upon the symptoms. On the twelfth day he was inclined to play with his toys; his vomiting had ceased, but the pallor and the feebleness of the heart continued. He suddenly screamed out with pain in his leg along the great vessels, and in a few moments was dead. I think the pain in his leg was caused by a dislodged embolus from the enfeebled heart.

Another case was seen by me for a fellow-practitioner who said that the child was convalescing from diphtheria. A change had occurred during the day, and when I saw the child she was almost pulseless, although the mother had noticed nothing. The patient died in a few hours.

In another case, in a rural district, as soon as the child was apparently well, the parents most unwisely took it out for a ride. When they brought it home it expired soon after being taken into the house.

In these cases there were no other paralytic symptoms. The force of the poison seemed to be exerted upon the cardiac apparatus, and, most probably, upon its nerve-supply. If these children had lived it is possible that some of them would have had paralysis of other parts.

In the general multiple neuritis of diphtheritic origin the prominent symptoms are often not noticed for several weeks after the disappearance of the primary disease. It is thus customary to say that they appear suddenly, and that the poison, whatever it is, has lain dormant in the system for a long time, but the observation of Bernhart, already alluded to, that the knee-jerk is absent in many cases, must make us cautious about accepting this opinion as final. I have had reason to believe that these symptoms have often been insidious in their approach, and hence unnoticed. If a child has only an abolished knee-jerk, and continues listless, the actual state may readily be overlooked; even a slight nasal twang in its voice might escape notice; until at last regurgitation of fluids, head-drop, and an ataxic gait force attention. I had a case recently which illustrates some of these facts:

A boy, aged five years, had extensive pharyngeal diphtheria, with swollen glands. He was treated with the chloride of ammonium and tincture of the chloride of iron internally, and the same remedies were thoroughly applied with a brush to the throat at frequent intervals. He made a good recovery, and had no nerve symptoms, unless it was the weakened patellar reflex. After an interval of five weeks he was again brought to me in a bad condition. He could not articulate clearly; the soft palate was flaccid and rather anæsthetic; the left eye had convergent squint (paralysis of sixth nerve). There was no paralysis to light or of accommodation, although the latter was not tested by near objects, as the boy could not read. He had head-drop, caused by paralysis of the muscles at the back of the neck; there was loss of power in the forearms; the patellar reflexes were abolished; cutaneous sensibility was difficult to test. This child was admitted at once into the Home for Crippled Children, and under care and treatment recovered. On inquiry I found that the symptoms had been coming on very gradually. These were strangling, regurgitation of fluids, dropping of the head, and a staggering gait. When strabismus became marked the parents were alarmed and sought advice. There was probably no time after his supposed recovery from the diphtheria that nerve lesion in some minor degree, shown by abolished patellar reflex, ataxia, and nasal speech, could not have been detected by a more careful examination.

The lesson to be drawn from this case is obvious. The physician should not think his duty done when he has cleared away the membrane and established convalescence. If he remembers that he has had to combat a nerve poison, which in many cases shows

its effects almost from the start, he will be guarded in his prognosis and more expert in detecting early symptoms.

The treatment of diphtheritic paralysis itself is mainly expectant. The nerve lesions demonstrated in the autopsies of these cases are degenerative—destructive; they are the lesions especially of parenchymatous neuritis—*i. e.*, destruction of the axillary fibre, segmentation of the medullary substance, and proliferation of the cell-elements in the nerve-sheath. The repair must be by a gradual and rather slow nutritive process.

The effect of drugs upon this process is at least problematical. Strychnine has been recommended, apparently because it acts as a violent excitant upon healthy motor-nerve cells, but why this endows it with a power to build up degenerated cells, both motor and sensory, has not been explained. Our knowledge of it is therefore empirical, and justifies its use in moderate doses. We may theorize that as an excitant to nerve tissue it excites nutrition, somewhat as a mechanical irritant will determine blood to a part, or as increased functional activity promotes structural increase. Clinical observations confirm the use of the drug. It has been used hypodermically with advantage, but I have seen ugly abscesses follow, which must be guarded against by careful antisepsis. Digitalis appears to be indicated in failing heart-power. I have used it in large doses when the pulse became feeble; but I doubt if it has the power to support a heart which is failing because of ptomaine poisoning of the nerve-elements. To do so effectually it would have to be antidotal to the noxious agent, and of this there is no evidence. I have not seen it act advantageously when cardiac collapse was sudden and marked. If digitalis acts upon the heart chiefly through the nerve-supply, as seems to be the fact, it may be that a depressed or degenerated state of these nerves in such cases hinders its proper action. Alcohol, as a more diffusible stimulant, is better than digitalis. The most important indication is to feed; or, as has been said, "to keep the bloodvessels and lymph-spaces full." There is some reason to believe that full bloodvessels are the best antidote to the infectious diseases and the best remedy for many of their sequelæ. The phosphates, especially the old formula of Parrish, are invaluable in the treatment of diphtheritic paralysis.

Electricity holds, I think, a rather uncertain position at present in the treatment of the acute degenerative paralyses which have a tendency to recover. The faradic current will not act at all upon a degenerated nerve, such as I have briefly described above; and it is worse than useless, because it deceives the patient and tends to bring reproach on a valuable therapeutic agent. And yet it is the one remedy to which the majority of laymen, and even physicians, naturally turn. It is not uncommon in the several forms of paralysis in children for the family to buy a small faradic battery, and, with the physician's encouragement, use it upon a flaccid limb which gives no response. It is a sort of talisman. To be sure, in mild cases, in which the nerve-fibres are not completely degenerated, a response may be had, but it is difficult to see how, even then, an agent which acts by such a momentary shock can advance nutrition. The same objection does not apply to galvanism, which acts upon both degenerated nerve- and muscle-fibre, and probably promotes nutrition, although we do not know just how. It is the current which should be used, but only by the physician, as, indeed, is apt to be the case, because it requires a more expensive plant, which is more difficult to use and to keep in order than the faradic machine.

In conclusion, I desire to call attention to the fact that diphtheritic paralysis can be mistaken for locomotor ataxia. As this is a grave error, especially affecting the prognosis of the case, and as it might reflect seriously upon the reputation of the practitioner, it is evident that the distinction should be emphasized more than is customary. I recently saw a case of diphtheritic paralysis in a man, in the practice of a friend, in which the resemblance to locomotor ataxia was so marked as to deceive one observer. In this case there was a history of a precedent "sore-throat." The man had numbness of the extremities, slight ataxia, abolished patellar reflexes, and some suspicious change in the pupils. The principal points of distinction were the loss of muscular power, flabby muscles, absence of fulgurant pains, ability to stand firm with closed eyes, and the history of his precedent diphtheria.

The changes in the pupils in diphtheritic paralysis are the opposite of those occurring in the "Argyle-Robertson" phenomenon of locomotor ataxia—*i. e.*, in diphtheritic paralysis the power of accommodation is lost to near objects and not the reflex to light. The onset of locomotor ataxia is more gradual than that of the other disease. In children the resemblance of the two affections is not so great, and locomotor ataxia in them is, of course, very rare, but in adults the symptoms may be confusing.

A CASE OF PORRO-CÆSAREAN OPERATION.[1]

BY J. F. BALDWIN, M.D.,
OF COLUMBUS, OHIO.

MRS. I. F. W., aged twenty-four years, weight 100 pounds, height 47½ inches. I was called to see the patient by her attending physician,

[1] Read at the meeting of the Ohio State Medical Society, June 5, 1890.

Dr. J. F. M. Heeter, July 12, 1889, and found a typically rhachitic dwarf, who was, according to her account, at about the full term of gestation. External and internal examination showed a uniformly contracted pelvis, with an antero-posterior diameter of about one and one-fourth inches. The case was manifestly one for the Cæsarean section, or some of its modifications, and it was agreed that the Porro operation was the best under the circumstances. The patient was quite intelligent, and placed herself unreservedly in our hands. Her hygienic surroundings were bad, as she lived with her husband in a cellar basement.

July 16, 10 P. M., I was called again and found her in labor. The pains were short and frequent and the os just beginning to open. Labor had commenced about five hours before. We ordered full doses of morphine, hoping thus to delay labor so as to operate by daylight. But in this we were disappointed. The pains continued to increase in frequency and severity, and by 2 A. M. of the 17th it was evident that longer delay would diminish the chances of recovery. The pains at that time recurred every three minutes, and the os was dilated to about the size of a twenty-five cent piece.

Accordingly, the operation was commenced as soon as the necessary assistants could be secured. Dr. W. H. H. Nash administered the chloroform, Dr. E. J. Wilson assisted directly, Dr. J. Leeper watched the pulse, Dr. S. L. Kistler held the rubber tube, and Dr. Heeter took charge of the infant.

The operation was performed after the method of Tait. While I had with me, for any emergency, my regular laparotomy case of instruments, I laid out: Two scalpels (one for shaving the pubes), a few hæmostatic forceps, two feet of pure rubber tubing, two knitting needles, ligatures, sponges, a drainage-tube and sutures.

As soon as the parts were cleansed and shaved an incision was made in the linea alba down to the womb, the incision being barely long enough to enable me to introduce my hand. The rubber tube looped between two fingers was then carried over the fundus and pulled down to the cervix, the fingers being carried around at this point to ascertain that no bowel had been caught. Everything then being in readiness, this tube was quickly tightened, a single hitch made, and the ends given to an assistant. The uterus was next incised, this small incision torn by the two index fingers to the full extent of the abdominal incision, a leg grasped and the child promptly delivered. Dr. Heeter at once seized the cord with compression forceps, cut it and proceeded to resuscitate the child. The placenta was then extracted through the wound, the womb lifted out of the abdomen, the rubber tube tightened and secured by a second hitch, the cervix transfixed by the knitting needles in the form of a St. Andrew's cross, and the body of the womb with the ovaries and tubes cut off. There was no hæmorrhage from the stump, but there was some from the left broad ligament, which seemed to have been cut by the pressure of the tube. This hæmorrhage was easily controlled, though, owing to the poor illumination, it caused considerable delay. The bleeding point being finally secured, the abdomen was thoroughly washed out, a drainage-tube inserted, the incision closed in the usual way, and the stump treated with perchloride of iron. There was no perceptible shock, and the patient came out from the anæsthetic nicely. There was some discharge, for a few hours, from the drainage-tube, which was removed on the second day.

Convalescence was prompt and unmarked by any special occurrences. The highest temperature was 101°. The rubber ligature came away with the slough on the thirteenth day. Her milk came in small quantity at first, but soon became ample for the support of the child. In three weeks she was permitted to be removed to a distant part of the city and the case was virtually dismissed.

The child was a female and weighed at birth seven and a half pounds. Although inheriting the peculiar deformity of the mother, it thrived very well until April 6, 1890, when it became affected with angina Ludovici, of which it died two days later.

Remarks.—The fortunate result in this case is to be attributed almost entirely to the promptness with which operative procedures were instituted. As

soon as it is determined that an operation is necessary and that the parts are in a proper condition, further delay is fraught with danger, and every hour of suffering and consequent exhaustion inflicted on the woman diminishes the chances of recovery. A very few hours of delay may suffice to turn a glorious success into a disastrous failure.

According to the statistics of Dr. R. P. Harris, of Philadelphia, this case ranks ninth among American Porro operations, and is the third successful one. It is the first in Ohio.

Tait is a strong advocate of the Porro-Cæsarean section, and under many circumstances, as when the operation has to be done at night, it is certainly the operation to be elected; but when the circumstances are favorable I regard the Sänger-Cæsarean section as preferable, for two reasons: First, because its death-rate is lower; and, second, because it does not in any way unsex the woman. But she should not be subjected to the risk of again becoming pregnant, and hence the Fallopian tubes should be ligated and cut across before the abdomen is closed.

But the Porro operation is easier of execution. Tait says it is as easy as the application of the long forceps, and hence should be selected by operators not familiar with abdominal work.

The technique of the operation, as given by Tait, is as follows:

"The first step is the abdominal incision, four inches in length, involving first the skin and then the muscles down to the sheath of the rectus, all of which ought to be divided by a sharp knife at one blow; then the tendon of one or other of the recti is opened, the muscular tendons fall aside, the posterior layer of the tendon is nipped up by two pairs of forceps and divided between them. The extraperitoneal fat is treated similarly, then the peritoneum is raised again by two pairs of forceps, a slight notch being made between them, and the moment this is effected air enters and all behind falls away. No director is required, nothing but an observant pair of eyes, lightly applied forceps, and a delicately applied, sharp-cutting knife. The finger is then introduced into the peritoneal cavity, and the relations of the uterus and bladder exactly ascertained. The peritoneum is then opened to the full extent of the four-inch incision, and the cut edges of the peritoneum are seized on each side by a pair of forceps and are pulled severally to the respective sides. No better retractors can be employed.

"The piece of India-rubber drainage tube, about eighteen inches or two feet long, is now held as a loop between the fore and middle finger of the left hand, and is by that means slipped up over the uterus and pulled down over the cervix, passing the fingers behind the cervix to see that coils of intestine are not included in it. One hitch is then made on the tubing when it has been got as far down as possible, and it is pulled as tight as is consistent with safety. The second hitch may be made in it, but what is far better an assistant keeps the tube on the strain, so that one hitch will be quite enough to effect the most efficient clamping.

"A small hole is then made in the uterus, just large enough to admit the finger. If it is possible, the position of the placenta may then be ascertained; if not, the right forefinger follows its colleague, and between the two, by gentle rending, an aperture is made in the uterus and the leg of the child is seized. The fœtus is then carefully delivered feet first, and this, despite all the authorities to the contrary, is by far the best proceeding; less blood is lost, and it requires but very gentle manipulation to release the head.

"As soon as the fœtus is removed, the placenta is sought for and removed similarly; the uterus itself, being completely contracted by this time, is then pulled out of the wound and the elastic ligature is tightened once more and finally arranged round the cervix, and the second hitch is applied. The main details of the operation are now completed; all that is required is to pass the needles through the flattened tube and through the uterus and out at the other side, forming a St. Andrew's cross, or two parallel bars, to support the weight of the uterus and the stump and keep it outside the wound. A complete toilet of the peritoneum is then made, not forgetting the anterior vesical *cul-de-sac;* stitches are passed in the ordinary way to close the wound accurately round the uterine stump.

"The uterus is now removed close down to the needles and strangulating rubber tubes, so as to leave a little tissue above. It does not do to run any risk of the ligature slipping off, though this is hardly possible after the needles have been passed carefully through the structure of the tube. A little perchloride of iron is then rubbed gently over the surface of the stump; it is dressed with dry lint and some dry cotton gauze, an ordinary obstetric wrapper is put on, and the operation is at an end. The operation really takes very much less time to perform than it takes to describe, and, as I have said before, because the details must always be the same, it is an operation in which there can never arise any unforeseen or unexpected difficulty."

In connection with this I may be allowed to state that during the last year, and in addition to this Porro operation, I made three other laparotomies.

One for adherent ovary and Fallopian tube. The parts were torn loose, but not removed. The patient made a prompt recovery, the temperature never rising above 98.6° nor the pulse above 80. Drs. Wilson, Nash, and Adams assisted me.

A second for chronic salpingitis, with retroversion and universal adhesions. The operation was exceedingly difficult, great force being required to tear up adhesions. The tubes and ovaries were removed, the uterus, which was adherent in its abnormal position, was torn loose and stitched to the anterior abdominal wall. There was free hæmorrhage, which was with difficulty controlled. Patient made an excellent recovery. I saw her about six months later and found her in robust health and the uterus in normal position.

The third case was one of uterine fibroid with general adhesions, following repeated attacks of pelvic peritonitis. The relative dangers of hysterectomy and of removal of the appendages were fully presented to the patient, and she preferred the latter operation. The operation was quite difficult owing to the adhesions, but was successful. The patient made an excellent recovery, and reports, four months after the operation, that there has been no menstruation; that she is free from attacks of pelvic inflammation, and that the tumor is perceptibly reduced in size.

I was assisted in these last two operations by Drs. Walker and Morehead, of Plainfield, Ohio, and in the last by Dr. F. F. Lawrence, of Columbus.

A CASE OF PRURITUS UNIVERSALIS PRODUCED BY THE PASSAGE OF A BOUGIE.

BY ORVILLE HORWITZ, B.S., M.D.,

DEMONSTRATOR OF SURGERY IN JEFFERSON MEDICAL COLLEGE; CHIEF OF OUTDOOR SURGICAL DEPARTMENT, JEFFERSON MEDICAL COLLEGE HOSPITAL; SURGEON TO THE PHILADELPHIA HOSPITAL, ETC., ETC.

RECENTLY a case of pruritus universalis, produced by the passage of a bougie for the cure of a lesion in the urethra, presented itself to the writer, and so far as can be ascertained it is the only case reported to the profession where the passage of an instrument has been the cause of this most distressing disease.

The writer in the course of a large experience in urethral work has seen many cases of general and local, motor, sensory and secretory neurosis dependent upon lesions of the urino-genital apparatus; but he did not believe it possible, nor did he accept it as a fact, until repeated experiments with passing a bougie produced after each operation an attack of pruritus universalis, that it was due to the instrument.

E. B., aged thirty; single; merchant. Began to masturbate at fifteen years of age and continued to do so until his eighteenth year, when he discontinued the habit and indulged in frequent sexual intercourse. This he practised three or four times a week, cohabiting twice and often four or five times a night. States that he never had any venereal disease, has not indulged in the use of intoxicating liquors, and is not a smoker.

About one year before presenting himself for treatment he began to suffer from pain in the back and nucha; later, there was burning pain on passing water, the burning sensation lasting a considerable time after each effort at micturition. He lost flesh, became morbid, irritable and restless, and sleep was unrefreshing and unsound. Heart, lungs, and urine normal.

On examination a contracted meatus and a stricture, calibre 20 F., just back of the orifice, were found. The most intense hyperæsthetic condition prevailed throughout the entire canal, especially in the prostatic portion.

The pain caused by the passage of the exploratory bougie was so intense as to produce slight epileptiform convulsions. The patient states that he had never before been similarly affected.

The meatus was enlarged and the stricture divided so as to admit the passage of a 35 F. meatus-bougie. The patient was directed to take a hot hip-bath every night before retiring; to pass a 35 F. meatus-bougie daily; to refrain from sexual intercourse, and to take sulphate of atropine, $\frac{1}{60}$ grain, with sodium bromide, 1 drachm, at bed-time.

At the end of three days he again presented himself. The burning pain after urination was much relieved; he was still suffering from pain in the back and head.

At this visit a bougie, 31 F., was passed into the bladder. Three days later the bougie was again introduced.

On the following morning an urgent message was received from the patient requesting the writer to call as soon as possible. On visiting the invalid's house he was found in bed, suffering agony from general pruritus, which had begun on the penis and scrotum and had gradually spread over the body.

To relieve the suffering every remedy recommended by the most reliable authorities was tried without any immediate benefit. Within the space of eight or ten days the pruritus gradually subsided, when a bougie was once more introduced, and the pruritus returned. A trip to Atlantic City was now recommended, and the patient remained at that resort for two weeks, when he returned, much improved in general health.

Up to this time no connection between the pruritus and the passage of the bougie had been suspected; it was presumed to be merely a coincidence. A bougie was therefore again introduced, when the terrible itching on all parts of the body returned in full force. At the end of five days, the pruritus having disappeared, the bougie was once more introduced, when the itching returned with undiminished vigor.

It now became manifest that the pruritus was entirely due to the passage of the bougie, and that the plan of treatment must be changed. A 6-per-cent. solution of cocaine was injected into the urethra, and having passed a Winternitz psychrophor, water at the temperature of 57° F. was introduced into the instrument, reducing the temperature of the water at the end of five minutes to 52° F.

A spinal ice-bag was applied to the lumbar region every night before retiring for the space of one

hour, massage used every morning, and a Turkish bath once a week. Later, after the patient began to convalesce, the following remedies were prescribed: Sulphate of quinine, sulphate of iron, of each 2 drachms; phosphate of zinc, 2 grains; sulphate of strychnine, ⅔ grain: divided into 40 pills, of which 1 was taken morning and evening. Under this treatment the patient rapidly recovered. He has since married.

It would seem at first glance to be difficult to explain the sympathy that evidently existed between the irritability of the urethra and the irritability of the cutaneous surface, but reflection naturally leads to the conclusion that inflammatory lesions of the prostate gland bear the same relation to nervous affections of the male that lesions of the uterus do to allied disorders in the opposite sex.

The prostate and the structures intimately associated with it are largely supplied by nerves derived from the hypogastric plexus of the sympathetic, the several plexuses of the spinal nerves, and from the lumbar plexus through the lumbo-sacral trunk, and by reason of this free interchange of nerve fibres between the sympathetic and the cerebro-spinal system of nerves that the component parts of the genitalia are not only in intimate connection with one another, but, through the agency of the cord, with remote parts; hence it is that hyperæsthesia and inflammation of the prostate gland and its included structure, give rise not only to essential symptoms, but occasion various signs in other organs and tissues which are of a reflex or functional nature.

EARLY OPERATIONS IN PURULENT PERITONITIS.[1]

BY JOSEPH PRICE, M.D.,
OF PHILADELPHIA.

IN operations for purulent peritonitis, the results have been almost uniformly satisfactory. Dr. Bantock, in a late discussion, said that in opening the abdomen for these cases, he has been very much disappointed with the results. Possibly, he says, *he operated too late*, but *always* with unsatisfactory results—drainage did not seem to make any difference for *all* the patients died. Such an experience from such an operator, is a most telling argument for the early interference which he has advocated in other abdominal troubles.

No case of *general* puerperal peritonitis will recover without operation. Where there are simple inflammatory signs without localized mischief, which is the focus of the general trouble, recovery will follow general treatment. If there is pus in these cases, the necessity for early operation is as much to be recognized as in any other case or set of cases in abdominal surgery. There is but one treatment for suppurative peritonitis—section, irrigation, and drainage. Postponement is more dangerous than the operation, and at the worst only hastens a result which is certain to follow without operation.

In the *Medical Mirror*, May, 1890, is reported a case of general peritonitis, from appendicitis, in which the patient died on the thirty-first day. The results of delay are here too evident, when we take into consideration the numerous cases of appendical trouble, now relieved by prompt operation.

The late Lexington disaster, in which Colonel Goodloo lost his life, by a delay in operating of twenty-four hours, followed by another case in the same city, in which prompt intervention saved the patient, who is now active and well, is also a lesson in cases of this kind.

Further, to illustrate the subject, I introduce the following cases of my own. Other recent illustrations could easily be cited, but these are sufficient:

CASE I.—Mrs. B., aged twenty-eight years. Seen five weeks after labor. High temperature; rapid pulse; rapid progressive emaciation; profound sepsis. Abdominal section revealed, thickened omenteum adherent over entire pelvis; right pyosalpinx and abscess the size of an orange in the ovary; universal adhesions; six inches of ileum cheesy and disorganized to the mucous coat along the line of adhesion on the right side. A knuckle of bowel was opened in enucleating the appendages; it was trimmed and stitched; there was purulent peritonitis, and one pint of pus free in pelvis, from leakage; appendages removed; cavity irrigated and drained; recovery.

CASE II.—Mrs. M., aged twenty-four years, seen twenty-one days after labor. Abdominal section showed acute puerperal pyosalpinx on the left side, and general purulent peritonitis; bowel, omentum, and pelvic organs matted together by friable adhesions; left tube gangrenous; right tube congested, but showed no evidence of pus; only the left tube removed; irrigation and drainage; recovery.

CASE III.—Mrs. W., aged thirty-six; seen twelve days after labor; most profoundly septic. At the section universal friable adhesions were found; both appendages absolutely gangrenous; uterus large and soft, with cheesy walls; removal of both appendages; irrigation and drainage; recovery.

CASE IV.—Mrs. F., aged twenty-three; seen four weeks after labor; removal of both appendages for left pyosalpinx and ovarian cyst; right tube occluded, adherent, and acutely inflamed; adhesions universal; general peritonitis; irrigation and drainage; recovery.

CASE V.—Mrs. S., seen two years after labor. She had puerperal fever and was in bed nine months; since then has been a hopeless invalid, with loss of locomotion, constant agonizing pain, great emaciation, constant nausea and recurring attacks of peritonitis. I removed a left psyosalpinx and ovarian abscess; dense bowel adhesions; omenteum, bladder,

[1] Read before the American Medical Association, Section of Surgery, May, 1890.

and uterus glued together; irrigation and drainage; recovery from the operation and cure.

It should be noted that:

1st. All were cases of true puerperal "fever."

2d. All were saved by section, after well-directed medical treatment.

3d. The operations were undertaken to save life, not to demonstrate ideal surgical procedures.

CLINICAL MEMORANDA.

MEDICAL.

Cancer of the Pancreas and Stomach in a Woman aged Twenty.—Clara L., single, was admitted to Dr. Morris Longstreth's wards at the Pennsylvania Hospital, February 20, 1890.

For the following notes of the case I am indebted to Dr. F. B. Gummey, the resident physician:

Patient's mother died of abscess of the liver, and one uncle of phthisis contracted during the war. Her family history was otherwise negative. She had never been robust, and after a wetting, four months before her admission, menstruation ceased, and since then she has suffered greatly from pains at the epigastrium, flatulence, and constipation. The pain had been so severe as to prevent her from sleeping. It was sometimes most severe beneath the left nipple, at others, on a level with the seventh dorsal spine. At other times she had severe lancinating pain along the fifth and sixth left intercostal spaces, but it was, for the most part, worse at the epigastrium than elsewhere. There had also been progressive emaciation and loss of strength. Tongue dry and coated. Patient very anæmic. Examination of heart and lungs negative. Urine normal.

Treatment.—Calomel and soda, and milk diet.

February 24. Vomiting and flatulence relieved, but pains unabated. No tumor can be felt in the epigastric region.

March 5. Passages chalky and liver dulness apparently diminished, but there is no jaundice.

7th. Cannot retain more than an ounce of milk at a time, which is given every hour; pain radiates to the right as well as to the left hypochondriac and lumbar regions.

15th. Passages somewhat more natural after taking chopped meat and a more liberal diet.

On March 28th it was noted that she had been taking one-quarter of a grain of codeine for the relief of her pains.

On April 14th it was noted that codeine, and even morphine, in doses of one-sixth of a grain, relieved the pain only slightly. The dorsal pain was intense, patient saying "that she felt as if some one were scraping her backbone with a knife." A distinct bruit was heard over the abdominal aorta close to the cœliac axis. No thrill nor excessive pulsations could, however, be detected. The left rectus muscle very tense, and sore to the touch. Peptonized milk was ordered, but, as it induced vomiting, it was discontinued.

April 15. Ordered peptonized beef, reduced iron, and Fowler's solution, three drops three times a day, on account of the progressive anæmia. A systolic murmur was heard over the aortic cartilage.

22d. Pains unabated. At 2.15 o'clock this morning patient vomited about five ounces of blood. Up to this time she had neither vomited blood nor passed it by stool. Her pulse immediately became small and frequent, and she became dizzy, and had marked hallucinations of sight and hearing. She was given fluid extract of ergot one drachm, opium one grain, and ten minims of aromatic sulphuric acid, which she retained. Ten minutes later twenty grains of tannic acid were administered, which induced vomiting. Vomiting of blood recurred twice during the night.

While visiting the wards about noon of the following day, I was called in to see her, and found that she had another rather copious hæmorrhage from the stomach, and that her pulse was almost imperceptible. Whiskey was given hypodermically, and champagne was given by the mouth, and she soon rallied a little; her pulse returned, and she was able to swallow and to retain milk in teaspoonful doses. Enemata of peptonized milk were ordered.

23d. She was a little stronger. Nutritive enemata and hypodermic injections of whiskey and of tincture of digitalis continued. Her stomach, however, retained nothing, so the champagne was stopped.

24th. Three more hæmorrhages to-day; pulse imperceptible, somewhat delirious.

25th. Died, after a hæmorrhage, early this morning.

Autopsy showed that the head of the pancreas was firmly adherent to the greater curvature of the stomach, and presented distinct carcinomatous infiltration. In the greater curvature of the stomach, about midway between the pyloric and cardiac orifices, was a circular excavation, about three inches in diameter, the sides and floor of which showed carcinomatous infiltration. The liver was adherent to the stomach, and presented on its under surface one or two points of carcinomatous infiltration.

HENRY M. FISHER, M.D.

HOSPITAL NOTES.

LUPUS AND INFLAMMATORY NODULES ON THE FACE—DIFFERENTIAL DIAGNOSIS OF A CHRONIC INFLAMMATORY NODULE FROM EPITHELIOMA—INCIPIENT SCABIES—AND OTHER CASES.

Abstract of a Clinical Lecture delivered at the New York Post-Graduate Medical School.

BY ROBERT W. TAYLOR, M.D.,
PROFESSOR OF DERMATOLOGY AND SYPHILOGRAPHY.

CASE I.—The first case was that of a girl, seventeen years old, with a good family history. The eruption from which she was suffering followed a mild attack of scarlet fever at the age of nine years. "Blisters" first made their appearance, and subsequently developed into abscesses of the post-cervical glands. One or two of these abscesses were treated by incision. This history, Dr. Taylor said, was not uncommon. For eight years there had been a warty incrustation at the site of the original incision on the left side of the neck. On pinching up the patch of skin situated about three

inches in front of the right ear (the "naso-labial zone"), it was found decidedly indurated and thickened; the skin was reddened, and the epithelium was shiny and cracked. This patch was oblong, and about one and a half inches long; and on its upper part were crusts composed of serum, epithelium, and sebaceous matter. The disease evidently involved the whole thickness of the skin. The lesion pointed either to a late syphilide, or to lupus; but the history, and the absence of all concomitant symptoms, excluded syphilis; while the age of the patient, and the history, pointed indisputably to lupus. Lupus, Dr. Taylor said, usually begins before puberty, either at quite an early age, or between nine and twelve years. Formerly, lupus was considered as a scrofulous trouble, but modern medicine demands a more exact nomenclature; and since the discovery of the tubercle bacillus, clinical observations have furnished some reasons for believing that lupus is a localized tuberculosis. It is reasonable to suppose that the debilitated state of the system existing after scarlet fever, especially if complicated with cervical suppurative adenitis, offered a favorable opportunity for the entrance of such bacilli into the system; and clinical experience shows that the scars or unhealed wounds left after such an adenitis are prone to degenerate into lupoid tubercles. It has been claimed by some that the tubercle bacilli have been found in lupoid nodules, but equally competent observers emphatically deny this. These discrepancies might be explained by the well-known fact that the skin is not a favorable habitat for the bacilli, and that, consequently, they are not found in this tissue in large numbers.

Treatment.—Only external remedies are indicated. The crusts should be removed, and the underlying portions well curetted under cocaine, after which an ointment, consisting of one drachm of balsam of Peru to the ounce of vaseline, should be applied. Carbolic acid ointment might be substituted for this; or, if the patient were in bed, cotton soaked with a five-per-cent. solution of carbolic acid should be applied until the inflammation subsides, when the balsam of Peru could be employed.

CASE II.—The next case, a woman, thirty-three years of age, had on the tip of the nose an irregularly round, infiltrated, and ulcerated patch, which had existed for nine years, during which time she had enjoyed otherwise perfect health. The history, together with the non-destructive character of the lesion, excluded both syphilis and lupus; and the diagnosis rested between an inflammatory nodule resulting from the long-continued irritation of a pustule, and an epithelioma. The ante-auricular glands were slightly enlarged, but the cervical glands were normal.

Epithelioma, Dr. Taylor said, usually begins either as a minute crack, as a small wart, as a slight brownish discoloration of the skin, or as a small papule at the side of the nose, which bleeds freely upon irritation. The disease is sometimes of very slow growth, and exists perhaps for many years before showing its malignancy; but when this becomes manifest, the growth is found surrounded by a wall of distinctly thickened and slightly nodular tissue. In epithelioma of the face there is very slight glandular involvement. In this case there seemed to be no good grounds for believing that the lesion was more than a chronic inflammatory condition of the skin.

Treatment.—After thoroughly cleansing the part, it should be well curetted under chloroform or cocaine anæsthesia, and then irrigated with a five-per-cent. solution of carbolic acid. The subsequent process of healing should be treated on general principles; usually the balsam of Peru ointment is quite satisfactory.

CASE III.—The next patient was a man who, at first, appeared to have only a few patches of thickened skin in the interdigital spaces of the right hand; but other similar patches were found along the left wrist and forearm, with a few scattered papules on the abdomen. The eruption caused much itching. The lecturer said that the case was one of incipient scabies, and still in the papular stage.

Treatment.—His bedding should be entirely renewed, and clean clothes provided. After a thorough soaking in an alkaline bath, consisting of one pound of sal-soda to thirty gallons of water at 100° F., he should receive a thorough inunction with the following ointment:

Naphthol Balsam of Peru	. .	of each 1 drachm.
Vaseline		1 ounce.

This, in so mild a case, will probably be all that is required.

CASE IV.—The next case afforded an excellent study in diagnosis. The patient, a man twenty-four years of age, had had a hard chancre five months before, and still had a cervical adenopathy, with the remains of a roseola upon the body and shoulders. On the forearms were to be seen the lesions of psoriasis which had existed as long as the patient could remember; while, by a peculiar coincidence, the outer aspect of the arm was the seat of a syphilitic papular eruption of recent development. In the absence of such a clear history, one would have been inclined to consider the entire disease psoriasis. Another point of interest was the epithelial hyperplasia found on the sides of the tongue; for a few authors claim that psoriasis occasionally affects the mucous membranes.

Treatment.—This patient should receive the usual antisyphilitic treatment by baths and inunctions.

CASE V.—Another manifestation of syphilis, alopecia, next received attention. The man, thirty years old, was in the fifth month of his syphilis. The spots of alopecia were quite small, and did not present the shiny appearance of alopecia areata. There were papules and pigmented patches on the hands; round, ulcerated, and exfoliated patches upon the tongue; the throat was filled with ulcers, and the tonsils were much enlarged.

Treatment.—The patient was cautioned about conveying contagion by means of cups, tobacco-pipes, and similar utensils, and directed to spray and gargle the throat frequently. In severe cases of syphilitic sore-throat in hospital, Dr. Taylor directs the patient to gargle for fifteen minutes with a drachm of table salt to a tumbler of water, as hot as can be tolerated, and then to use the following strong gargle:

Bichloride of mercury . . .	8 grains.
Tincture of myrrh . . .	½ ounce.
Water	8 ounces.

When the ulcerative process begins to subside, the quantity of bichloride should be gradually reduced. The patches on the hands should be rubbed every night with mercurial ointment, and gloves worn during the night.

CASE VI.—Another patient, a Chinaman, forty-seven years old, who had had a chancre four years before, and had been pretty thoroughly medicated with the mixed treatment, presented himself with a non-ulcerating tubercular syphilide on the left side of the neck, showing decided thickening of the skin, and extending at the periphery in an irregular manner. This lesion belonged to the tertiary period.

Treatment.—Dr. Taylor directed the continued application of mercurial ointment, with frictions of the part, and the administration of the following:

Biniodide of mercury . . .	3 grains.
Potassium iodide	6 drachms.
Comp. tinct. of cinchona . . .	4 ounces.

One teaspoonful three times, increasing to four or five times, daily.

CASE VII.—A young woman was then shown with condylomata near the anus, which, if not treated, would extend and lead to ulceration, fissure, and stricture of the rectum.

Treatment.—The treatment should consist in the judicious use of mercury, if possible by inunction, and the careful washing of the patches with carbolic soap, followed by dusting with calomel and the application of cotton.

MEDICAL PROGRESS.

The Administration of Creasote in Phthisis.—From observations made on seventy-three cases of phthisis treated with creasote, DR. WILLIAM H. FLINT (*New York Medical Journal*, July 26, 1890) draws the following conclusions:

1. That intrapulmonary and intratracheal injections of creasote are of doubtful utility, and may be positively injurious.

2. That, for administration by mouth or rectum, solutions and emulsions of creasote are preferable in most cases to capsules, pills, or wafers.

3. That milk is an excellent vehicle for the administration of creasote in solution or in emulsion.

4. That each method of administering creasote used by the author—viz., by inhalation, by mouth or rectum alone, and by both the latter channels simultaneously—is useful, and may each be particularly adapted to individual cases. In suitable cases the most rapid progress seems to be made when all these methods are utilized.

5. That the best results for each individual attend the administration of the maximum quantity of creasote which this patient will bear.

6. That the average patient will not easily tolerate more than ten to fifteen minims of creasote *per diem* for any great length of time, and that many will only bear two or three drops *per diem*, continuously administered.

7. That it is very important that the treatment be uniform and uninterrupted.

8. That, consequently, an effort should always be made, if intolerance of creasote is shown by any one mucous surface, to employ some other channel of introduction, in order that the continuity of the treatment be not interrupted.

The solution used by Dr. Flint for inhalation was composed of equal parts of creasote, alcohol, and chloroform. The inhalers used were Dr. Robinson's and that of the Brompton Hospital. In mild cases the inhalations were given for fifteen minutes, every two or three hours, in severe cases every hour during the day, and every three hours during the night. Internally he at first used Jaccoud's mixture (creasote, 6 minims; glycerin, 1 ounce; whiskey, 2 ounces), but found that the creasote could not be given in large dose without administering at the same time more whiskey than, in many cases, was desirable. In some cases, too, it was not well borne. For these reasons he finally adopted an emulsion of cod-liver oil, 40 parts; mucilage of acacia, 60 parts; with 2 minims of creasote to each drachm. This was well tolerated, especially if given after food. In suitable cases the emulsion was given every two hours and increased up to the point of toleration. To patients who could be persuaded to adopt temporarily an exclusive milk diet the creasote emulsion was administered in the milk, being thoroughly mixed with the latter by energetic shaking. Dr. Flint succeeded in giving more creasote in this manner without exciting gastric disturbances than by any other method. In several cases twenty-four minims of creasote were daily given for several consecutive days.

Iodoform-emulsion in the Treatment of Tuberculous Joints and Cold Abscesses.—At the recent meeting of the German Surgical Association (*Centralblatt f. Chirurgie*, June 21, 1890), BRUNS of Tübingen, and KRAUSE of Halle, reported their results in the treatment of tuberculous joints and cold abscesses by means of injections of mixtures containing iodoform. Bruns uses a sterilized mixture containing 1 part of iodoform to from 10 to 20 of olive oil or glycerin, which is injected into the abscess cavity after the pus is evacuated. The operation may be repeated, if necessary, and usually within a few weeks or months the abscess diminishes, and finally disappears. Bruns has treated in this manner over 100 cold abscesses, among them 10 cases of psoas abscess, with 80 per cent. of cures. He has also used the method in the treatment of tubercular pleuritis, and in 50 cases of tubercular joint-disease, with surprisingly good results, even in cases of long duration. If there are fungoid, tuberculous granulations in or around the joint he inserts a hollow needle, breaks them up and injects in one or more places from 30 minims to 1½ drachms of the emulsion. If there is an abscess, the pus is withdrawn and the cavity filled with the emulsion.

Nearly all the surgeons who discussed this paper were in accord with the author. Trendelenburg said that he had treated 135 cases in this manner. Von Eiselsberg said that Billroth had practised the method with satisfaction in the treatment of cold abscesses and other tubercular diseases since 1881.

Krause reported 60 cases of joint disease treated by injecting a 10-per-cent. emulsion of iodoform in glycerin, or a mixture of iodoform in water of the same

strength. In 36 cases of knee-joint disease there were 15 cures, in 15 of hip-joint disease 4 cures, in 6 of disease in the tarsus 1 was cured, and in 5 of disease in the joints of the hand 3 were cured. All of these cases were far advanced when the treatment was commenced. If there are abscesses around the joint, Krause evacuates them and washes out the cavities with boric acid solution before injecting the iodoform. The injections are made every two, three, or four weeks, according to the severity of the case.

Extemporized Surgical Gauzes. — HELBING gives the following recipe for the rapid preparation of surgical gauzes: Select a good material, free from oily matter, weighing about ten drachms per square yard, and having not less than thirty threads, running each way, in the square inch. Weigh out as much of the gauze as is required, and take a corresponding weight of the antiseptic. The material should be saturated with ether or with a mixture of ether and alcohol, in which the antiseptic has been dissolved, one ounce of the gauze requiring thirty ounces of solution. The gauze is wrung out several times and resaturated. In drying the gauze, it should simply be unfolded and shaken a few times. All the different gauzes may, in this manner, be prepared, as carbolic acid, corrosive sublimate, eucalyptol, iodoform, or thymol.—*Pharmaceutical Era*, June, 1890.

Injection of Filtered Air in the Diagnosis of Ruptured Bladder. — PROFESSOR KEEN suggests the following method (*Annals of Surgery*, July, 1890), which he has not yet used in practice, of determining the presence of a rupture of the bladder:

1. Introduce the catheter and empty the bladder of any urine that may be present.

2. Connect the catheter with an ordinary Davidson's syringe. This should have been disinfected. Over the distal end of the syringe a moderately large mass of absorbent cotton is tied. If the operator prefers, he can connect the distal end by a rubber tube, which has been padded with absorbent cotton, which may itself have been made antiseptic. The cotton in either case acts as a bar to the entrance of germs, as in the tubes of bacteriologists. Air is then pumped into the bladder. Should no rupture have occurred, the rounded, elastic, tympanitic bladder will appear in the hypogastrium. Should there be a rupture, the air will escape through the rent into the general peritoneal cavity, and distend the entire belly. It is, perhaps, even a needless precaution to have the air free from germs in carrying out this procedure, for, should the bladder be ruptured, laparotomy, of course, would be done, and the unfiltered air of the room would gain free access to the peritoneal cavity from the abdominal wound. If the bladder is not ruptured, the air pumped in would, of course, escape at once by the catheter, and have done no harm; but it would be better to filter the air, and so exclude any possibility of infection.

Ear Reflexes.—DOWNIE (*Archiv f. Kinderheilkunde*) describes various reflexes having their origin in the ear, which are familiar to otologists, but, perhaps, not so well known by general practitioners. Cough, this writer says, may be excited by introducing unwarmed specula into the meatus, and may also be produced by inspissated cerumen, especially if the mass is loose and changes its position during the movements of the lower jaw. This cough is often falsely called "stomach cough." Foreign bodies in the ear may produce similar phenomena. The author reports an example in which a phthisis-like cough with pulmonary symptoms disappeared after removing a plug of cerumen. Irritation of the external canal may cause gastric reflexes, such as vomiting. Aural polypi, as well as cerumen plugs, may excite irregular cardiac action, which rapidly disappears after removing the local trouble. Epileptiform convulsions may be due to the same causes, in proof of which the author cites a series of cases observed by himself.—*Archives of Gynæcology and Pædiatry*, July, 1890.

Violet Mouth-wash.—The following is said to be an excellent mouth-wash:

℞.—Tincture of benzoin	7	parts.
" " rhatany	30	"
" " myrrh	60	"
" " orris root	500	"
Rose water	250	"
Alcohol	250	" —M.

—*American Practitioner and News.*

Treatment of Anal Fissure.—*L'Union Médicale* for June 28th gives the following formula for the treatment of anal fissure;

Boric acid	45 grains.
Hydrochlorate of cocaine	15 grains.
Lanolin	1 ounce.

This is to be made into an ointment and applied to the fissure, after which the spot is to be touched with a solid stick of silver nitrate.

Lactic Acid Treatment of Diarrhœa. — HAYEM has recently reported before the *Société Médicale des Hôpitaux* the success which has attended his employment of lactic acid in diarrhœa. He prescribes the acid in the dose of 2 drachms in the form of a lemonade, made as follows:

Lactic acid	2 drachms.
Simple syrup	½ ounce.
Water	3 ounces.

To be drunk during the intervals between meals.

HAYEM thinks this particularly useful for the diarrhœa of typhoid fever, and in that form of lientery dependent upon *hypo*-acidity of the stomach. The same observer also recommends it as a cure, and prophylactic in epidemic cholera.—*L'Union Médicale*, June 28, 1890.

Salve for Alopecia.—MORWIN recommends, in *L'Union Médicale* for June 28, 1890, the following salve for alopecia:

Gallic acid	45 grains.
Essence of lavender	15 drops.
Vaseline	1½ ounces.
Castor oil	6 drachms.

This is to be well rubbed in at night over the part affected.

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SATURDAY, AUGUST 9, 1890.

THE TENTH INTERNATIONAL MEDICAL CONGRESS.

RECOGNIZING the interest which every member of the profession must feel in the proceedings of the Tenth International Medical Congress, now holding its meetings in Berlin, THE MEDICAL NEWS presents in this issue two of the most important papers read by Americans, and also a detailed account by cable of the meetings of August 4th, 5th, and 6th. The paper by Dr. Wood not only possesses a value of its own, but a peculiar interest in that it was the only address delivered before this representative body of medical men as the contribution of American medicine to the general fund of knowledge, while that of Dr. Billings is noteworthy because of its scientific bearing upon questions which are of peculiar interest to the Germans, and to all countries forced to maintain large armies.

The use of the cable also places in the hands of each reader of THE NEWS a report of the three most important days of the meeting almost before the Americans who attended the Congress have had time to digest the information to which they listened; and in the issue of August 16th we hope to present the proceedings of the closing days of the meeting in an equally readable form.

PERFORATION OF TYPHOID ULCERS.

IN the treatment of typhoid fever no danger is so much dreaded as hæmorrhage from the ulceration of a bloodvessel in a Peyer's patch, or the collapse which is sure to follow perforation of the intestine through the same morbid process. Everyone who has seen much of typhoid fever must have met with cases in which during advanced convalescence or in a mild period of the attack one of the accidents named above has occurred, and has felt that at last the case had been taken entirely beyond his control and that the patient was doomed almost without a single hope. Very recently before the Association of American Physicians, at their meeting in Washington, DR. JAMES E. REEVES, of Chattanooga, expressed the belief that he had seen recovery take place after perforation had occurred in enteric fever, and although others of wide experience, notably Dr. Loomis, of New York, expressed a doubt if any such cases were *bona fide* perforations, and if recovery ever followed perforation, several instances confirming the assertions of Dr. Reeves have been recently reported.

In the *Deutsche medicinische Wochenschrift* of December 26, 1889, DR. REUNERT reports three cases, all occurring in women under forty-eight years, in which during the course of enteric fever all the classical symptoms of perforation occurred, such as collapse, violent pain in the belly, and a rapid, feeble pulse, with a great fall of bodily temperature. The vomiting was incessant, and palpation revealed a swelling in the right iliac fossa of considerable size, while constipation was present. In all these instances opium, small pieces of ice taken by the mouth, and the general measures devoted to the treatment of peritonitis occurring in a feeble subject were resorted to, and recovery ultimately occurred, the patients, after some weeks of convalescence, leaving the hospital entirely well. It would appear, therefore, that perforation of the intestine in typhoid fever is not necessarily fatal, although the vast majority of cases do not survive the accident.

Aside from the question which we have just been considering, another point of interest, of a surgical character, is not to be overlooked. Already surgeons have reduced the mortality of intestinal perforations arising from traumatic causes to a very low percentage, and a few of them have been bold enough to attempt such measures in the perforations we are considering. Although the results reached

in most instances have not been encouraging, in certain picked cases we believe an operation to be perfectly justifiable, and, if the accident occurs during advanced convalescence from indiscretions in diet, to be absolutely indicated. Indicated, because the escape of pieces of hard food into the abdominal cavity places the patient beyond all hope of recovery, and because his physical state at such a time is sufficiently good to give a skilful surgeon at least a chance of saving the patient's life.

THE RECENT ELECTRICAL EXECUTION.

THE revolting details of the recent electrical execution have been so fully reported in the newspapers that more than an allusion to them in our columns is unnecessary. The results of this, the first execution under the guidance of science, will give the opponents of the method a powerful weapon, and, we fear, it is not improbable that the law requiring the execution of condemned murderers by electricity will be in consequence repealed. The enemies of capital punishment, too, will use the reports to endeavor to prove that no form of execution can be painless, and that the maximum penalty for murder should be imprisonment for life. From the daily papers we learn that our esteemed contemporary, the *Medical Record*, will editorially take this opportunity of denouncing all forms of capital punishment.

It must be remembered that the entire proceeding was in the nature of an experiment; that those in charge were nervous and apprehensive of failure, and thereby incapable of carrying out the verdict of the court with proper precision. Furthermore, it is probable that after the first shock the contortions of the victim were as painless as the legendary spasms of the frog's legs on Volta's copper railing.

Sickening and revolting as the spectacle was, there is reason to believe that the death was less painful than is ordinarily that by hanging, after which muscular spasms often continue for many minutes. It has been claimed by the opponents of electrical execution that this method of punishment is brutal, but the measure of brutality should be the suffering of the victim, and no proof is available that death was not painless in this instance. We believe that the death penalty should be effected by electricity. Hanging has become so familiar to us that its brutality is forgotten. We forget that many a man on the gallows dies from *slow* asphyxia—than which probably no form of death is more horrible. Electricity is a substitute not only better from the standpoint of simple humanity, but, as shown by Professor J. William White in a letter to this journal (April 26, 1890), is more likely to prevent crime. Dr. White's belief is that the criminal classes are influenced more by the probability of conviction than by the severity of the punishment, and that the number of convictions increases in direct proportion to the mildness of the penalty. The New York Commission to Investigate the Most Humane and Practical Method of Carrying into Effect the Sentence of Death reached the same conclusion, and reported that "any undue or peculiar severity in the mode of inflicting the death penalty neither operates to lessen the occurrence of the offence, nor to produce a deterrent effect."

It is, therefore, clearly evident that upon other grounds than pure humanitarianism capital punishment should be as painless as it can be made.

That electricity can be so applied as to cause instant and painless death no one can doubt who reads of the too frequent fatal accidents with broken "live wires."

One object of the new law, and a laudable one, is to limit the publication of the details of an execution to a simple statement of absolute fact. This has been entirely ignored—horrible, disgusting, and exaggerated descriptions were spread broadcast, descriptions that no one can read without a sense of degradation. For this publicity unfaithful servants of the law and the reportorial desire for the sensational are responsible.

It is greatly to be hoped from the standpoints of humanity, and for the checking of crime, that the State of New York will not hastily abandon the advanced position she has assumed in this matter, and equally desirable that before a second execution by electricity takes place, competent and cool-headed officials will be selected to carry into effect the verdict of the law.

The autopsy showed that the changes in the floor of the fourth ventricle were sufficient to cause death, and it cannot be doubted that death would have taken place without delay but for the too early order to stop the current. The misfitting of the head electrode was no worse than the misplacing or slipping of the hangman's noose, and the slight burning of the body of no more moment than the awful parchment-like blue line of the rope with the exophthalmic eye and swollen face.

(*By Cable.*)

SPECIAL CORRESPONDENCE.

INTERNATIONAL MEDICAL CONGRESS.

Tenth Annual Session.
Held at Berlin, August 4th–9th, 1890.

(*From our own Correspondent.*)

THE International Medical Congress was called to order in the Circus Renz, on Monday morning, August 4th, by the President, Professor Virchow. The beautifully decorated hall held 5000 representatives from all parts of the world, to whom Professor Virchow extended a most hearty welcome. In his opening address he called attention to the great advances in medicine, and to the value of international meetings in uniting the medical world in the struggle against disease and death. He further said that the object of medical associations should not be to get more pay or shorter hours, but to increase our ability for research, and to diminish the dangers that surround humanity. He expressed the Emperor's sympathy with the objects of the Congress, and said that Germany would devote herself to science and humane efforts.

Secretary Lassar reported that 5000 delegates were present, 2500 of whom were foreigners. Of all countries the United States takes the lead, with 500 delegates. England follows with 300. It was announced that there were 700 papers to be read in the three official languages, namely, English, German and French. This report was followed by addresses of welcome by Herr von Boettscher, German Minister of Education, and the representative of the Chancellor; Herr von Gossler, Prussian Minister of Ecclesiastical Affairs; Herr von Fordensbeck, the Mayor of Berlin, and by Dr. Graf, President of the German Medical Association. On behalf of the American delegation, Surgeon-General Hamilton thanked the Germans for their great hospitality; Sir James Paget tendered the thanks of the English delegates, Dr. Bouchard those of the French, and Dr. Bacelli then spoke for Italy, in a delightful Latin oration, that charmed the hearers and demonstrated that the dead language united all scientists. Tremendous applause proved how well the oration was appreciated.

The following Honorary Presidents were then announced: From the United States, John S. Billings, M.D.; Austria, Professor Billroth; England, Dr. Stokes; France, Professor Bouchard; Italy, Dr. Bacelli; Germany, Carl Theodore, Duke of Bavaria, who, though of royal blood, is a distinguished surgeon. Professor Virchow was made the permanent President and Dr. Lassar, the permanent Secretary.

Sir Joseph Lister then read a paper entitled "The Present Position of Antiseptic Surgery," in which he referred to Metschikoff's brilliant experiments in regard to the destruction of bacteria by the amœboid cells of living tissue, and showed how small particles of septic material are destroyed by leucocytes. He said that the work of Tait and Bantock is not opposed to the principles of antisepsis, but, on the contrary, that their cleanliness, and care in the preparation of instruments, sponges, and dressings show how well they follow the laws of antisepsis.

He believed in the use of strong antiseptic washes in all surgery except that of the peritoneum, where we should use solutions not stronger than 1 to 10,000, and in synovial membranes, where 1-to-4000 solutions are proper. The spray, he said, has no real value, and he hopes that the day may come when we will need little irrigation and no drainage. Floating particles in ordinary air, he thinks, can be disregarded. He recommended the double-cyanide gauze as the best dressing.

Dr. Robert Koch, the famous discoverer of the tubercle and cholera bacillus, followed with a paper on "The Present Status of Bacteriological Science." He thinks that the future will give us fixed ideas of the etiology of all infectious diseases, be they bacterial or not. He believes that species of bacteria are fixed and that one form cannot develop into another. In bacterial examinations he said that we must never depend on one characteristic, but should exhaustively test all the qualities. He described a new bacillus, very similar to that of tuberculosis, but showing slight differences, and though it had puzzled the author of the paper, it is now established that this new form is a distinct species which causes chicken tuberculosis. It seems now that the exanthemata are not due to bacteria, but, perhaps, to some organism similar to the plasmodium malariæ; but long and patient work and culture experiments must decide this point. The results of bacteriology are comparatively slight so far, but if the apparent results of his present work are true, bacteriology will be a greater science in the future. He has a new remedy by which he can check tuberculosis in the guinea pig, and can prevent even inoculations from affecting the animal; he did not say, however, what the remedy is.

Tuesday was devoted to the work of the sections. In the section of Internal Medicine the treatment of chronic nephitis was the main theme. An absolute milk diet and the administration of little medicine seemed to be in the opinion of all present the proper treatment.

The treatment of tubercular peritonitis by laparotomy was discussed very fully. No one seemed to have a clear idea of how a cure takes place after abdominal section, although according to the re-

ports cure results in 30 to 60 per cent. of the cases. It was therefore thought that laparotomy is the best therapy if a diagnosis can be positively established. In the acute miliary form operation was, of course, considered of little value.

Terillon reported his results in resection of the stomach and intestine for carcinoma. His present position is that although so far no operation has resulted in preventing a recurrence of carcinoma, the patient's comfort is so much increased and his days so much lengthened that it is our duty to give him the benefit of an operation.

At the second general session, Sir James Paget and Dr. John S. Billings presiding, it was decided to hold the next meeting of the Congress at Rome. The official records show an attendance of 5561 members. Of these there are 623 Americans, 421 Russians, 353 English, and 171 French.

Professor Bouchard, of Paris, then spoke for two hours on the "Mechanism of Infection and Immunity, and was followed by Axel Key, of Stockholm, on The "Relation of Puberty to the Diseases of School Children." Key has found that the year of greatest growth in boys is the seventeenth; in girls the fourteenth. While girls reach full height in their fifteenth year they acquire full weight at the age of twenty. Boys are stronger than girls from birth to the eleventh year; then girls become superior physically to the seventeenth year, when the tables are again turned and remain so. He stated that from November to April children grow very little and gain no weight; that from April to July they gain in height but lose in weight, and that from July to November they increase greatly in weight but not in height. These are the result of over 6000 observations. During the school months children suffer far more from disease than in the vacation, and during school years far more than before or after. Key thinks that usually school work is far too hard in the lower classes and that the children do not get sufficient muscular strength. Less school work and more physical training until the twelfth year are necessary to make our coming generation strong; and a child should not undergo any severe mental labor.

There is a splendid exhibition of medical and surgical appliances, in which all nations are represented. The place of the special sessions is the famous Art Exposition buildings, and no International Congress ever met in more beautiful quarters. The arrangements are perfect, and one hears nothing but praise from all foreigners. Very differently were the Americans treated who attended the British Medical Association, in Birmingham — over fifty withdrew their credentials on the second day, and nearly every American member resigned. The Americans are intensely indignant, especially so at Mr. Lawson Tait. Further details concerning the action of these delegates will be sent in time for your next issue. Tuesday evening the city of Berlin gave a magnificent banquet to the foreigners in the city hall, and Wednesday evening there were banquets by the different sections. The delightful weather adds not a little to the enjoyment of the meeting.

CORRESPONDENCE.

LONDON.

Nurses and Nursing. Operative Treatment of Pyæmia following Ear-disease. Legislation for Infant Life Insurance. The Amended Scheme for the new University of London.

Nurses and nursing have lately been much discussed. A few days ago the National Pension Fund for Nurses was formally inaugurated by a most successful gathering under the direct patronage of the Princess of Wales, when about a thousand nurses who have already enrolled themselves as members were present. The institution has made a most excellent start, a sum of something like £70,000 having been already accumulated, largely owing to the munificence of four donors of £10,000 each. Started almost contemporaneously with this is the Jubilee Institute for Nurses, which also has the advantage and benefit of royal patronage, for the Queen has graciously handed over the money received from the women of England in commemoration of her jubilee to found an institution for supplying trained nurses to the sick poor in their own homes. A very representative committee has been appointed to carry the scheme into effect, the medical element on it being Sir James Paget and Sir Dyce Duckworth, whilst at least two of the ladies on the council have had some years' practical experience in nursing. For several years past a private association has been carrying on work of this kind as successfully as its limited means would permit, so that the new undertaking starts with every prospect of a career of great usefulness and success. The profession of sick-nursing has become so popular in late years that almost all the leading hospitals have started nursing homes, and advertise their willingness to send out nurses to private cases. The fact is that this is a very satisfactory way of making money, as from one to two guineas a week are charged, which, of course, leaves a good margin for profit. Of course, the thing will soon be overdone, and there are indications that before long the market will be overstocked, but we have not yet quite reached that point.

In a former communication I alluded to Mr. Arbuthnot Lane's work on the subject of pyæmia consecutive to ear-disease and thrombosis of the lateral sinus. He has followed up his former paper with a note on pyæmia from otitis without thrombosis of the lateral sinus, and apparently his remedy is to ligature the internal jugular vein and occlude the sinus. He does not give the line of reasoning which led him to adopt the treatment, but it appears to have been successful. His patient was a child of three years, admitted for a left otorrhœa of three weeks' duration, and facial paralysis of that side for about the

same length of time. A week before the patient came under observation the discharge ceased, the mastoid area became tender, and he had a rigor every day. On admisssion to the hospital there was a fluctuating swelling over the mastoid, some discharge from the meatus and facial paralysis; there was no optic neuritis. His temperature was 104°. Under an anæsthetic the mastoid antrum, which was distended with pus, was obliterated by levelling down its edges, and the middle ear was freely opened, so that the dura of the middle fossa was exposed. It was thickened and inflamed, but there was no pus on it. On the evening of the following day he had a rigor, and the next morning the dura of the posterior fossa was fully exposed, and a collection of pus discovered between the lateral sinus and adjacent dura and temporal bone. Though the wall of the sinus was soft and doughy, there was no evidence of thrombosis. The child had a rigor that day and on the following day, and Mr. Lane then determined to ligature the internal jugular vein, and to open and plug the lateral sinus. The vein was thereupon ligatured, but the child became so collapsed that the subsequent steps of the operation were deferred. On the following day he had a rigor, and on the succeeding day Mr. Lane reopened the wound, and found that the sinus was firm, having evidently quite recently undergone thrombosis. From this time up to the date of the report, sixteen days later, the child did well, and his condition was, in all respects, satisfactory. Mr. Lane is certainly to be congratulated, for in the hands of a less courageous operator it is more than likely that the disease would have run its usual course to a fatal termination.

Two schemes are at present before the Legislature with a view to the better protection of infant life. That which is though to have the most chance of becoming law is the one introduced into the House of Commons, which makes more stringent regulations respecting baby-farming. The other is the bill of the Bishop of Peterborough introduced into the House of Lords, and at present passing through the ordeal of a preliminary committee. The bishop, who is certainly one of the greatest orators of the day, did not mince matters when introducing his bill, and did not hesitate to say that children were killed for the sake of the insurance money notwithstanding all the supposed safeguards of a medical certificate of the cause of death, or even a coroner's inquest. His proposals strike at the root of the whole matter, and, in my opinion, no scheme will be efficacious which does not follow pretty closely the lines he has laid down. The pith of his proposal is that the parents shall not directly or indirectly receive any money on account of the death of a child; they may insure its life as at present, but the amount insured shall be paid solely to the undertaker, and shall not exceed that necessary for the funeral expenses. It is rumored that there is very little chance of such a bill getting through the House of Commons, but I am quite sure that nothing else will really check the present great and growing evil.

The University of London, or rather the senate of that university, have promulgated their revised scheme for the re-constitution of the university, and it seems to be meeting with considerable support. University and King's Colleges have already accepted it, and it remains to be seen what the College of Physicians and Surgeons will do. Whatever they do must be done jointly. On the whole, the scheme seems to be as favorable to them as anything they are likely to get in any other way, for it provides that they shall conduct the examinations in conjunction with the university, but it is not made clear in what way the new examination is going to be more accessible than the old one. Two great causes of complaint against the existing scheme are the severity of the preliminary examination in scientific subjects, and the fact that a man cannot count any medical study toward his degree till he has passed this examination. These two facts do not seem to be in any way remedied, so I doubt very much whether the student will really be much better off. The scheme has not, however, yet been approved by all parties concerned.

NEWS ITEMS.

The Nova Scotia Medical Society.—The twenty-second annual meeting of the Nova Scotia Medical Society was held July 2d, 3d, and 4th, at Granville Ferry, Annapolis County. The following officers were elected for the ensuing year: Dr. J. A. Coleman, of Granville Ferry, President; Drs. Stephen Dodge, of Halifax, and G. E. Buckley, of Guysboro, Vice-presidents; Dr. W. S. Muir, of Truro, Secretary and Treasurer. Delegates were chosen to meet delegates from the New Brunswick and Prince Edward Island associations, with a view to a union of forces under the guise of a Tri-provincial or Maritime Medical Association. If such a union is effected, the membership will be not far from six hundred.

Mississippi Valley Medical Association.—The Mississippi Valley Medical Association will hold its sixteenth annual session at Liederkranz Hall, Louisville, Kentucky, October 8, 9, and 10, 1890. The medical profession is cordially invited to attend. Papers are solicited, the titles of which should be sent to the Secretary, Dr. E. S. McKee, 57 W. Seventh Street, Cincinnati, as soon as possible. The social arrangements are to be in keeping with Kentucky's well-known hospitality. The programme is already assuming proportions of magnitude and interest, and is still growing. The annual meeting of the American Rhinological Association will be held at the same place, October 6, 7, and 8, 1890. The Secetary, Dr. R. S. Knode, National Bank Building, Omaha, Nebraska, will receive titles to papers. Dr. John A. Wyeth, of New York, and Dr. Frank Woodbury, of Philadelphia, have consented to read papers.

Medical Missions.—At a recent meeting in London the subject of medical missions was discussed. One of the speakers, a veteran official from India, stated that among the Asiatics no mission can be regarded as fully equipped unless it has a medical department. Medical skill is extremely important as a pioneer influence, and a physician will be able to establish a mission where others would fail to obtain a footing. The Indian government highly appreciates the work that has been done by the medical men who have gone among the wild tribes along the northern frontiers. Traders know of all these posts, and frequently travel a long distance to obtain medical assistance. In January, 1879, a very warlike tribe on the frontier made a raid on Tonk, which is in

British territory. The place was sacked and burned; but the hospital and the house of the medical missionary were spared, because half of the patients that had been treated there were members of the attacking tribe.

An Aboriginal Method of Preventing Over-population.—An editorial in the *Weekly Medical Review* describes the following curious method of preventing over-population as practised by the aborigines of Australia. The method, called the "mika" operation, consists in making an incision into the urethra, near the scrotum, with a flint knife, cauterizing the wound with hot stones, and inserting wooden pegs to prevent closure during cicatrization. In some tribes it is said that all but about five per cent. of the male children are compelled to undergo the operation. In other tribes the operation is postponed until just before marriage.

Medico-Chirurgical College.—W. C. Hollopeter, M.D., has been elected Lecturer on Diseases of Children; and Ernest B. Sangree, M.D., Director of the Histological Laboratory.

The Climax of Quackery.—An infamous example of quackery was recently brought to light in Milwaukee, in the prosecution of the "Gun Wa Medical Company." The supporters of this fraud have branches in several cities, in which they advertise that they have an eminent Chinese physician, Gun Wa, who is versed in the medical lore of the Oriental schools, and who has a remedy for every disease to which flesh is heir. This "physician" is generally some ignorant laundryman, who knows too little English to be able to communicate with those who would consult him. He therefore has an interpreter—in Milwaukee this was "Doctor" Jansen—and this "interpreter" does not know a word of Chinese. During the active operations of this swindle in Milwaukee, this alleged famous Chinese physician, Gun Wa, was personated by three different laundrymen. It is not easy to conceive of a more barefaced and impudent imposture than this, which has been practised with considerable success in several Western cities.

A Summer Camp for Boys.—On the southern border of Lake Asquam, in New Hampshire, midway between Centre Harbor and Plymouth, is a camp for boys who require out-door life. The camp is on high and dry ground, with fine views of lakes and mountains. The exercises embrace boating, swimming, tours of exploration, base ball, tennis, and other summer sports, always under competent supervision. The physical needs of each boy are studied, with a view to instruct him in the proper manner of breathing, walking, running, jumping, and other forms of athletics in his critical formative period. The plan was originated by Mr. William T. Talbot, of Boston.

The Medical Department of the University of New York.—The Medical Department of the University of New York has just issued its semi-centennial catalogue; an interesting pamphlet, well illustrated with photogravures of all the new laboratory improvements. Our medical college annual announcements are too often not at all descriptive of their respective institutions, and this is a welcome departure from the old rule.

The New York Hospital Sunday Fund.—The collections on behalf of this fund in New York City, in 1889-'90, amount to $57,079, being the largest yet received. In the previous year the fund received $52,039; while in 1879, the year of the first collections, the receipts were $24,465.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM JULY 29 TO AUGUST 4, 1890.

With the approval of the Acting Secretary of War, leave of absence for ten days is granted CURTIS E. PRICE, *Captain and Assistant Surgeon.*—Par. 3, *S. O. 175, A. G. O., Washington, D. C.*, July 29, 1890.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF THE MEDICAL CORPS OF THE U. S. NAVY FOR THE WEEK ENDING AUGUST 2, 1890.

BLACKWOOD, N. J., *Assistant Surgeon.*—Ordered to duty in the Bureau of Medicine and Surgery.

WALES, P. S., *Medical Director.*—Ordered to duty in charge of the Museum of Hygiene.

OFFICIAL LIST OF CHANGES OF STATIONS AND DUTIES OF MEDICAL OFFICERS OF THE U. S. MARINE-HOSPITAL SERVICE, FROM JULY 5 TO JULY 26, 1890.

BAILHACHE, P. H., *Surgeon.*—Granted leave of absence for seven days, July 26, 1890.

HUTTON, W. H. H., *Surgeon.*—To proceed to Chicago, Ill., on special duty, July 24, 1890.

GODFREY, JOHN, *Surgeon.*—Granted leave of absence for thirty days, July 21, 1890.

PECKHAM, C. T., *Passed Assistant Surgeon.*—When relieved at Memphis, Tenn., to proceed to St. Louis, Mo., and assume command of the Service, July 9, 1890

DEVAN, S. C., *Passed Assistant Surgeon.*—Granted leave of absence for twenty-five days, July 15, 1890.

KALLOCH, P. C., *Passed Assistant Surgeon.*—Orders of July 5th, to St. Louis, Mo., revoked July 8, 1890.

WILLIAMS, L. L., *Passed Assistant Surgeon.*—Relieved from duty at Baltimore, Md., and to assume command of Service at Memphis, Tenn., July 8, 1890.

PERRY, T. B., *Assistant Surgeon.*—To proceed to Baltimore, Md., for temporary duty, July 17, 1890.

STONER, J. B., *Assistant Surgeon.*—Granted leave of absence for thirty days, July 21, 1890.

HUSSEY, S. H., *Assistant Surgeon.*—To proceed to Pittsburg, Pa., for temporary duty, July 18, 1890.

YOUNG, G. B., *Assistant Surgeon.*—Granted leave of absence for fifteen days, on account of sickness, July 12, 1890.

STIMPSON, W. G., *Assistant Surgeon.*—To proceed to Buffalo, N. Y., for temporary duty, July 12, 1890.

HOUGHTON, E. R., *Assistant Surgeon.*—To report to the medical officer in command New York Marine Hospital, for temporary duty, July 14, 1890.

PROMOTION.

MAGRUDER, G. M., *Passed Assistant Surgeon.*—To rank as such from July 12, 1890.

APPOINTMENTS.

HOUGHTON, E. R., *Assistant Surgeon.*—To rank as such from July 12, 1890.

BENEDICT, A. L., *Assistant Surgeon.*—To rank as such from July 24, 1890.

THE MEDICAL NEWS *will be pleased to receive early intelligence of local events of general medical interest, or of matters which it is desirable to bring to the notice of the profession.*

Local papers containing reports or news items should be marked. Letters, whether written for publication or private information, must be authenticated by the names and addresses of their writers—of course not necessarily for publication.

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